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GENERALISED ESTIMATION OF PROPERTIES OF DIAMOND CRITICAL RESOLVED SHEAR STRESS,YOUNG'S MODULUS,FRACTURE TOUGHNESS, SHEAR MODULUS, THERMAL CONDUCTIVITY,VICKER'S HARDNESS, SPEED OF SOUND, MEAN FREE TIME, SUFACE, CLEAVEGE ENERGY,UV AND VISIBLE OPTICAL ADSORPTION, CHANGE IN RESISTIVITY & GOSS AND CUBE TEXTURE QUANTIFICATION OF YBCO, NI BASED,MGB_2,NBTI,BSCCO,FESE,LAFEASO SUPERCONDUCTORS, KINEMATIC AND DYNAMIC VISCOSITY OF ALUMINIUM, COPPER, IRON, CHROMIUM, MOLYBENUM, TITANIUM, MAGNESIUM, ZINC BY AN EXPANSION INTO DIRECTION COSINES A1,A2,A3 WITH RESPECT TO THE CRYSTAL AXES

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Abstract
In this present article, Critical Resolved Shear Stress,Young's Modulus,Shear Modulus,Thermal Conductivity,Vicker's Hardness,Speed of Sound,Mean Free Time,Fracture Toughness,UV and Visible Optical Adsorption,Surface,Cleavage Energy,Change in Resistivity Of Diamond &Goss and Cube Texture Quantification of YBCO,Ni Based,MgB_2,NbTi,BSCCO,FeSe,LaFeAsO Superconductors is expressed by an expansion into Direction Cosines α_1, $\alpha 2$, $\alpha 3$ with respect to the crystal axes. The General Equation of Critical Resolved Shear Stress,Young's Modulus,,Yield Strength,Fatigue Strength,Ultimate Tensile Strength,Fracture Toughness,Shear Modulus,Thermal Conductivity,Vicker's Hardness,Speed of Sound,Mean Free Time,UV and Visible Optical Adsorption,Surface,Cleavage Energy,Change in Resistivity of Diamond & Goss and Cube Texture Quantification of YBCO,Ni Based,MgB_2,NbTi,BSCCO,FeSe,LaFeAsO Superconductors be used to determine their values at <100>, <110>, <111> directions respectively. In the present article Critical Resolved Shear Stress,Young's Modulus,,Yield Strength,Fatigue Strength,Ultimate Tensile Strength,Shear Modulus,Thermal Conductivity,Vicker's Hardness,Speed of Sound,Mean Free Time,Fracture Toughness.UV and Visible Optical Adsorptionis,Surface,Cleavage Energy,Change in Resistivity of Diamond & Goss and Cube Texture Quantification of YBCO,Ni Based,MgB_2,NbTi,BSCCO,FeSe,LaFeAsO SuperconductorsDynamic and Kinematic Viscosity of CopperAlumium,Iron,Chromium,Molybenum,Titanium,Magnesium,Zinc,Coherence length and Texture Factor of FeSe Iron Based Super Conductor <100>, <110>, <111> directions respectively. The Equation can be generalized to include any anisotropic property of material.

Keywords:
Anisotropic, Critical Resolved Shear Stress,Young's Modulus,Shear Modulus,Thermal Conductivity,Speed of Sound,Mean Free Time, Direction Cosines,Super conductors,Goss and Cube Texture,Kinematic and Dynamic Viscosity,Texture

I Introduction

Anisotropic Properties are those properties which vary with crystal direction,Anisotropic Properties of Diamond are Critical Resolved Shear Stress,Young's Modulus,Yield Strength,Fatigue Strength,Ultimate Tensile Strength,,Shear Modulus,Thermal Conductivity,Vicker's Hardness,Speed of Sound,Mean Free Time,Fracture Toughness.UV and Visible Optical Adsorption,Surface,Cleavage Energy,Change in Resistivity & Goss and Cube Texture Quantification of YBCO,Ni Based,MgB_2,NbTi,BSCCO,FeSe,LaFeAsO SuperconductorsDynamic and Kinematic Viscosity of Copper and Alumium,Iron,Chromium,Molybenum,Titanium,Magnesium,Zinc,Coherence length and

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Texture Factor of FeSe Iron Based Super Conductor. Diamond Properties namely Critical Resolved Shear Stress,Young's Modulus,Yield Strength,Fatigue Strength,Ultimate Tensile Strength,Shear Modulus,Thermal Conductivity,Vicker's Hardness,Speed of Sound,Mean Free Time,Fracture Toughness.UV and Visible Optical Adsorption,Surface,Cleavage Energy,Change in Resistivity & Goss and Cube Texture Quantification of YBCO,Ni Based,MgB_2,NbTi,BSCCO,FeSe,LaFeAsO Superconductors,Dynamic and Kinematic Viscosity of Copper and Alumium,Iron,Chromium,Molybenum,Titanium,Magnesium,Zinc,Coherence length and Texture Factor of FeSe Iron Based Super Conductor can be expressed as an expansion into direction cosines $\alpha_1,\alpha_2,\alpha_3$ with respect to the crystal axes.In the present article, consideration is made up to seven terms.

1.1 St3andard Equations

$$\xi^* = K_0 + K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$$

$$\xi^*=K_0 + K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)++K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$$

[uvw]	a	b	c	α_1	α_2	α_3	J_c, & A
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

II Calculation Properties of Diamond Critical Resolved Shear Stress,Young's Modulus,Yield Strength,Fatigue Strength,Ultimate Tensile Strength,Shear Modulus,Thermal Conductivity,Vicker's Hardness,Speed of Sound,Mean Free Time An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Table I : Critical Resolved Shear Stress,Young's Modulus,Shear Modulus,Thermal Conductivity,Vicker's Hardness,Speed of Sound,Mean Free Time,Fracture Toughness,UV and Visible Optical Adsorption,Surface,Cleavage Energy,Electrical Resistivity data along $\xi_{<100>},\xi_{<110>},\xi_{<111>}$ Directions

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Critical Resolved Shear Stress	560	227.5	525
Young's Modulus(GPa)	1050	1143	1220
Shear Modulus(GPa)	550	600	620
Yield Strength-YS(GPa)	20	15	12
Fatigue Strength-FS(GPa)	12	10	8
Ultimate tensile Strength-UTS(GPa)	30	25	20
Thermal Conductivity(W/m-K)	2200	2000	1800
Vicker's Hardness(GPa)	70	75	80
Speed of Sound(m/s) $*10^3$	12	11.5	11
Mean Free Time(s) $*10^{-12}$	1.0	0.8	0.6
Fracture ToughnessK_{IC} [$MPa.m^{1/2}$	3.4	3.8	5.3
UV Optical Absorption cm^{-1}	0.003	0.0008	0.0002
Visible Optical Absorption $cm^{-1} *10^{-9}$	5	4	3
Cleavage Energy,J/m^2	10	7	3.4
Suface Energy, J/m^2	5.3	3.7	2.3
Electrical Resistivity (Pure Diamond)Ω·cm	10^{15} Baseline resistivity	10^{15} Up to 1% higher or lower	10^{15} Up to 1% higher or lower

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Table II: Critical Resolved Shear Stress,Young's Modulus,Shear Modulus,Thermal Conductivity,Vicker's Hardness,Speed of Sound,Mean Free Time,Fracture Toughness,UV and Visible Optical Adsorption,Surface,Cleavage Energ ,Change in Resistivity data Elastic Constants C_{11},C_{12},C_{44} along $\xi_{<100>}$,$\xi_{<110>}$,$\xi_{<111>}$ Directions

Material Cubic Crystals	$\xi_{<100>}$	$\xi_{-<110>}$	$\xi_{-<111>}$
CRSS	C_{44}	$(C_{11}-C_{12})/2$	$(C_{11}-C_{12}+2C_{44})/3$
Shear Modulus	$(C_{11}-C_{12})/2$	$(C_{11}-C_{12}+2C_{44})/4$	$(C_{11}+C_{12}+4C_{44})/6$
Young's Modulus	C_{11}	$(C_{11}+C_{12}+2C_{44})/2$	$(C_{11}+2C_{12}+2C_{44})/3$
FracureToughness	$\sqrt{C_{11}}$	$\sqrt{(C_{11}+C_{12}+2C_{44})/2}$	$\sqrt{(C_{11}+2C_{12}+2C_{44})/3}$
Yield Strength(YS)	$C_{11}/2$	$(C_{11}+C_{12})/2$	$(C_{11}+C_{12}+4C_{44})/6$
Fatigue Stength(FS)	$C_{11}/2$	$(C_{11}+C_{12})/2$	$(C_{11}+C_{12}+4C_{44})/6$
Ultimate Tensile Strength(UTS)	$C_{11}/2$	$(C_{11}+C_{12})/2$	$(C_{11}+C_{12}+4C_{44})/6$
Vicker's Hardness	$[C_{11}/C_{12}]^{\alpha}$ * $(C_{11}-C_{12})/C_{44}$	$[C_{11}/C_{44}]^{\alpha}$ * $(C_{11}+C_{12})/2C_{44}$	$[C_{11}/C_{12}]^{\beta}$ * $(C_{11}+C_{12})/C_{11}$
Thermal Conductivity	$(Cv/3\gamma\rho)*(C_{11}+2C_{12})/\rho*C_{44}/\rho$	$(Cv/3\gamma\rho)*(C_{11}+C_{12})/\rho*C_{44}/\rho$	$(Cv/3\gamma\rho)*(C_{11})/\rho*C_{44}/\rho$
Longitudinal Mode of Velocity, V_L	$\sqrt{(C_{11}/\rho)}$	$\sqrt{(C_{11}+C_{12}+2C_{44})/\rho}$	$\sqrt{(C_{11}+2C_{12}+4C_{44})/3\rho}$
Transverse Mode of Velocity, V_T	$\sqrt{(C_{44}/\rho)}$	$\sqrt{(C_{11}-C_{12})/\rho}$	$\sqrt{(C_{11}-C_{12}+C_{44})/3\rho}$
Mean Free Time(s) : τ	$\tau\sim 1/\gamma C_{44}$	$\tau\sim 1/\gamma C_{44}$	$\tau\sim 1/\gamma C_{44}$
UV Optical Adsorption	$\alpha_{UV,[100]}=(C_{11}+C_{12})/Eg^2$	$\alpha_{UV,[110]}=(C_{11}+C_{44})/Eg^2$	$\alpha_{UV,[111]}=(C_{11}+C_{44})/Eg^2$
Visible Optical Adsorption	$\alpha_{VISIBLE,[100]}=(C_{11}+C_{44})/Eg^2$	$\alpha_{VISIBLE,[110]}=(C_{11}+C_{44})/Eg^2$	$\alpha_{VISIBLE,[111]}=(C_{11}+C_{44})/Eg^2$
Surface Energy,J/m^2	$C_{11}/2$	$(C_{11}+C_{12}+2C_{44})/4$	$(C_{11}+2C_{12}+4C_{44})/6$
Cleavege Energy,J/m^2	C_{11}	$(C_{11}+C_{12}+2C_{44})/2$	$(C_{11}+2C_{12}+4C_{44})/3$

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Change in Resistivity,$\Delta\rho$	$\Delta\rho[_{100}]=\pi_{11}c_{11}\epsilon_{xx}+2\pi_{12}c_{12}\epsilon_{xx}$	$\Delta\rho[_{110}]=\pi_{11(}c_{11+}c_{12+2}c_{14)/2}\epsilon_{xx}+\pi_{12(}c_{11+}c_{12-2}c_{44)/2}\epsilon_{xx+}\pi_{44}c_{44}\epsilon_{xy}$	$\Delta\rho[_{110}]=\pi_{11(}c_{11+2}c_{12+4}c_{44)/3}\epsilon_{xx}+\pi_{12(}c_{11+2}c_{12-4}c_{44)/3}\epsilon_{xx}+c_{11+2}c_{12-4}c_{44)/3}\epsilon_{yy)}$

For <100> directions, $\alpha_1=1, \alpha 2=0, \alpha_3=0$ ….[I]
For <110> directions, $\alpha_1=1/\sqrt{2}, \alpha 2=1/\sqrt{2}, \alpha_3=0$….[II]
For <111> directions, $\alpha_1=1/\sqrt{3}, \alpha 2=1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III]

2.1 Calculation Of CRSS of Diamond by An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Critical Resolved Shear Stress	560	227.5	525
Critical Resolved Shear Stress	C_{44}	$(C_{11}-C_{12})/2$	$(C_{11}-C_{12}+2C_{44})/3$

For <100> directions, $\alpha_1=1, \alpha_2=0, \alpha_3=0$ ….[I], in Standard Equation
$\xi_{CRSS}^* = K_0 + K_1 (\sum\alpha^2_1\,\alpha^2_2) + K_2 (\prod\alpha^2_1)$
We have
$\xi^*_{CRSS-<100>}= K_0 = C_{44}$;
For <110> directions, $\alpha_1=1/\sqrt{2}, \alpha_2=1/\sqrt{2}, \alpha_3=0$
Using [II] , in Standard Equation
$\xi^*_{CRSS-<110>}=K_0 + K_1 (\sum\alpha^2_1\,\alpha^2_2) + K_2 (\prod\alpha^2_1)$
$(C_{11}-C_{12})/2= K_0 + K_1 (\sum\alpha^2_1\,\alpha^2_2) + K_2 (\prod\alpha^2_1)$
$\Rightarrow (C_{11} - C_{12})/2 = C_{44} + K_1/4 + 0$
$C_{44} + K_1/4 = (C_{11} - C_{12})/2$……..[IV];
$K_1 = 2(C_{11} - C_{12}) - 4C_{44}$
For <111> directions, $\alpha_1=1/\sqrt{3}, \alpha_2=1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III];
$(C_{11} - C_{12} + 2C_{44})/3 = [C_{44}] + [\,2*(C_{11} - C_{12}) - 4C_{44}\,](\sum\alpha^2_1\,\alpha^2_2) + K_2 (\prod\alpha^2_1)$
$(C_{11} - C_{12} + 2C_{44})/3 = [C_{44}] + [\,2*(C_{11} - C_{12}) - 4C_{44}\,]/3 + K_2/27$
Multiplying by 27, we have
$9*(C_{11} - C_{12} + 2C_{44}) = 27[C_{44}] + 9*[\,2*(C_{11} - C_{12}) - 4C_{44}\,] + K_2$
$K_2 = 27[C_{44}] + 9*[\,2*(C_{11} - C_{12}) - 4C_{44}\,] - 9*[C_{11} - C_{12} + 2C_{44}]$
$K_2 = 27[C_{44}] + 18[C_{11}] - 18[C_{12}] - 36[C_{44}] - 9C_{11} + 9C_{12} - 18C_{44}$
$K_2 = 9[C_{11}] - 9[C_{12}] - 27[C_{44}] = 9\,[C_{11} - C_{12} - 3C_{44}]$ …..[V]
Substituting Values of K_0, K_1, K_2
$\xi_{CRSS}^* = K_0 + K_1 (\sum\alpha^2_1\,\alpha^2_2) + K_2 (\prod\alpha^2_1)$)
$\xi_{CRSS}^* = [C_{44}] + [2*(C_{11} - C_{12}) - 4C_{44}\,] (\sum\alpha^2_1\,\alpha^2_2) + 9\,[C_{11} - C_{12} - 3C_{44}\,](\prod\alpha^2_1)$

CRSS	C_{44}	$(C_{11}-C_{12})/2$	$(C_{11}-C_{12}+2C_{44})/3$

For Diamond, We Have $C_{11}=1050$; $C_{12}=595$; $C_{44}=560$;
$\xi_{CRSS}^* = 560 - 1330\,(\sum\alpha^2_1\,\alpha^2_2) - 11025(\prod\alpha^2_1)$
$\xi_{CRSS}^*=K_0 + K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)++K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

Critical Resolved Shear Stress	560	227.5	525

$\xi_{CRSS}^*=K_+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$
$\xi_{CRSS}^*=224 \quad -692.432(\sum\alpha_1\alpha_2)+224(\sum\alpha_1^2)+3(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)++336(\sum\alpha_1^3)+725.817(\sum\alpha_1^2\alpha_2\alpha_3)-112(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-112(\sum\alpha_1^6)$
/**********

Running Comptational Code, for getting standard equation using p1,p2,p3 for above properties
$p1=k0+k2+k5+k7+k9$
$p2=k0+0.5k1+k2+0.25k4+0.706k5+0.5k7+0.125k8+0.25k9$

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p3=*k*0+*k*1+*k*2+0.1923*k*3+0.333*k*4+0.5772k5+0.5772*k*6+0.333*k*7+0.3335*k*8+0.192k9
*k*0=2p1/5;*k*2=2p1/5;*k*5=3p1/5;*k*7=*k*9 = -p1/5;*k*4=2,*k*8=1;
*k*1=2*(p2 -*k*0-*k*2-0.25k4-0.706*k*5-0.5*k*7-0.25*k*9);*k*3=2
k6=5.2(p3-*k*0-*k*1 -*k*2-0.1923k3-0.3333*k*4 -0.5772*k*5-0.3333*k*7-0.333*k*8-0.1924*k*9)
p1=70;p2=75;p3=80, give values of k1,...k9
**********/

2.1 Calculation Of Young's Modulus of Diamond by An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Young's Modulus(GPa)	1050	1143	1220

Generalized equation in terms of 3terms:
$Y^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 =1, \alpha2 =0, \alpha_3=0$ ….[I] => $Y^*_{100} = K_0$
For <110> directions, $\alpha_1 =1/\sqrt{2}, \alpha2 =1/\sqrt{2}, \alpha_3=0$….[II] => $Y^*_{110} = K_0 + K_1/4$
=>$K_1=4[Y^*_{110} - Y^*_{100}]$
For <111> directions, $\alpha_1 =1/\sqrt{3}, \alpha2 =1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III]=> $Y^*_{111} = K_0 + K_1/3 + K_2/27$

- $Y^*_{111} = K_0 + K1/3 + K2/27 = Y^*_{100} + 4[Y^*_{110} - Y^*_{100}]/3 + K_2/27$
- $K_2 = [Y^*_{111} - Y^*_{100}] *27 - 36[Y^*_{110} - Y^*_{100}] = [27Y^*_{111} - 36Y^*_{110} +9\ Y^*_{100}\ ]$

Substituting back in Original Equation, we have
$Y^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$

$Y^* = Y^*_{100} + 4[Y^*_{110} - Y^*_{100}] (\sum\alpha^2_1\ \alpha^2_2) + [27Y^*_{111} - 36Y^*_{110} +9\ Y^*_{100}\ ](\prod\alpha^2_1)$
The values of $Y^*_{100,}\ Y^*_{110,}\ Y^*_{111}$ can be taken from Compliance Constants TABLE

Young's Modulus	C_{11}	$(C_{11}+ C_{12}+2C_{44})/2$	$(C_{11}+ 2C_{12}+2C_{44})/3$

$Y^*_{MODULUS}=K_+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$
$Y^*_{MODULUS}=420\ \ -434.44(\sum\alpha_1\alpha_2)+420(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)++630(\sum\alpha_1^3)-1605.715(\sum\alpha_1^2\alpha_2\alpha_3)-210(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-210(\sum\alpha_1^6)$

2.1 Calculation Of Fracture Toughness of Diamond by An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Fracture ToughnessK_{IC} [$MPa.m^{1/2}$]	3.4	3.8	5.3

Generalized equation in terms of 3terms:
$FT^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 =1, \alpha2 =0, \alpha_3=0$ ….[I] => $FT^*_{100} = K_0$

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For <110> directions, $\alpha_1 = 1/\sqrt{2}, \alpha 2 = 1/\sqrt{2}, \alpha_3 = 0$….[II] => $FT^*_{110} = K_0 + K_1/4$
=>$K_1 = 4[FT^*_{110} - FT^*_{100}]$
For <111> directions, $\alpha_1 = 1/\sqrt{3}, \alpha 2 = 1/\sqrt{3}, \alpha_3 = 1/\sqrt{3}$….[III]=> $FT^*_{111} = K_0 + K_1/3 + K_2/27$

- $FT^*_{111} = K_0 + K1/3 + K2/27 = FT^*_{100} + 4[FT^*_{110} - FT^*_{100}]/3 + K_2/27$
- $K_2 = [FT^*_{111} - FT^*_{100}] *27 - 36FT^*_{110} - FT^*_{100}] = [27FT^*_{111} - 36FT^*_{110} + 9\ FT^*_{100}]$

Substituting back in Original Equation, we have
$FT^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$
$FT^* = FT^*_{100} + 4[FT^*_{110} - FT^*_{100}] (\sum\alpha^2_1\ \alpha^2_2) + [27FT^*_{111} - 36FT^*_{110} + 9\ FT^*_{100}](\prod\alpha^2_1)$
The values of FT^*_{100}, FT^*_{110}, FT^*_{111} can be taken from Compliance Constants TABLE

FracureToughness	$\sqrt{C_{11}}$	$\sqrt{(C_{11}+ C_{12}+2C_{44})/2}$	$\sqrt{(C_{11}+ 2C_{12}+2C_{44})/3}$

$F^*_{FRACTURETOUGHNESS}=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$
$F^*_{FRACTURETOUGHNESS}=1.36-0.70048(\sum\alpha_1\alpha_2)+1.36(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)++2.04(\sum\alpha_1^3)+5.6(\sum\alpha_1^2\alpha_2\alpha_3)-0.68(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.68(\sum\alpha_1^6)$

2.2 Calculation Of Shear Modulus of Diamond by An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Shear Modulus(GPa)	550	600	620

Generalized equation in terms of 3terms:
$S^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 = 1, \alpha 2 = 0, \alpha_3 = 0$ ….[I] => $S^*_{100} = K_0$
For <110> directions, $\alpha_1 = 1/\sqrt{2}, \alpha 2 = 1/\sqrt{2}, \alpha_3 = 0$….[II] => $S^*_{110} = K_0 + K_1/4$
=>$K_1 = 4[S^*_{110} - S^*_{100}]$
For <111> directions, $\alpha_1 = 1/\sqrt{3}, \alpha 2 = 1/\sqrt{3}, \alpha_3 = 1/\sqrt{3}$….[III]=> $S^*_{111} = K_0 + K_1/3 + K_2/27$

- $S^*_{111} = K_0 + K1/3 + K2/27 = S^*_{100} + 4[S^*_{110} - S^*_{100}]/3 + K_2/27$
- $K_2 = [S^*_{111} - S^*_{100}] *27 - 36[S^*_{110} - S^*_{100}] = [27S^*_{111} - 36S^*_{110} + 9\ S^*_{100}]$

Substituting back in Original Equation, we have
$S^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$

- $S^* = S^*_{100} + 4[S^*_{110} - S^*_{100}] (\sum\alpha^2_1\ \alpha^2_2) + [27S^*_{111} - 36S^*_{110} + 9\ S^*_{100}](\prod\alpha^2_1)$

The values of S^*_{100}, S^*_{110}, S^*_{111} can be taken from Compliance Constants TABLE

Shear Modulus	$(C_{11}-C_{12})/2$	$(C_{11}-C_{12}+2C_{44})/4$	$(C_{11} + C_{12} + 4C_{44})/6$

$S^*_{MODULUS}=K_0K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$
$S^*_{MODULUS}=220 -36.36(\sum\alpha_1\alpha_2)+220(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)++330(\sum\alpha_1^3)+1232.97(\sum\alpha_1^2\alpha_2\alpha_3)-110(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-110(\sum\alpha_1^6)$

2.3 Calculation Of Yield Strenth(YS),Fatigue Strenth(FS),Ultimate Tensile Strenth(UTS) of Diamond by An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Yield Strength-YS(GPa)	20	15	12

Fatigue Strength-FS(GPa)	12	10	8
Ultimate tensile Strength-UTS(GPa)	30	25	20

2.3.1 Yield Strength Generalized equation in terms of 3terms:

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Yield Strength-YS(GPa)	20	15	12
Fatigue Stength(FS)	$C_{11}/2$	$(C_{11}+C_{12})/2$	$(C_{11}+ C_{12}+4C_{44})/6$

$\overline{Y}S^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1)$

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 =1, \alpha2 =0, \alpha_3=0$ ….[I] => $YS^*_{100} = K_0$
For <110> directions, $\alpha_1 =1/\sqrt{2}, \alpha2 =1/\sqrt{2}, \alpha_3=0$….[II] => $YS^*_{110} = K_0 + K_1/4$
=>$K_1=4[YS^*_{110} - YS^*_{100}]$
For <111> directions, $\alpha_1 =1/\sqrt{3}, \alpha2 =1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III]=> $YS^*_{111} = K_0 + K_1/3 + K_2/27$

- $YS^*_{111} = K_0 + K1/3 + K2/27 = YS^*_{100} + 4[YS^*_{110} - YS^*_{100}]/3 + K_2/27$
- $K_2 = [YS^*_{111} - YS^*_{100}] *27 - 36[YS^*_{110} - YS^*_{100}] = [27YS^*_{111} - 36YS^*_{110} +9 YS^*_{100}]$

Substituting back in Original Equation, we have
$YS^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1)$

- $YS^* = YS^*_{100} + 4[YS^*_{110} - YS^*_{100}] (\sum\alpha^2_1 \alpha^2_2) + [27YS^*_{111} - 36YS^*_{110} +9 YS^*_{100}](\prod\alpha^2_1)$

The values of $YS^*_{100}, YS^*_{110}, YS^*_{111}$ can be taken from Compliance Constants TABLE

Yield Strength(YS)	$C_{11}/2$	$(C_{11}+C_{12})/2$	$(C_{11}+ C_{12}+4C_{44})/6$

$YS^*=K_0K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

Yield Strength-YS(GPa)	20	15	12

$YS^*=8 \quad -10.944(\sum\alpha_1\alpha_2)+8(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+12(\sum\alpha_1^3)+36.2248(\sum\alpha_1^2\alpha_2\alpha_3)-4(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-4(\sum\alpha_1^6)$

2.3.2 Fatigue Strength,Generalized equation in terms of 3terms:

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Fatigue Strength-FS(GPa)	12	10	8
Fatigue Stength(FS)	$C_{11}/2$	$(C_{11}+C_{12})/2$	$(C_{11}+ C_{12}+4C_{44})/6$

$FS^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1)$

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 =1, \alpha2 =0, \alpha_3=0$ ….[I] => $FS^*_{100} = K_0$
For <110> directions, $\alpha_1 =1/\sqrt{2}, \alpha2 =1/\sqrt{2}, \alpha_3=0$….[II] => $FS^*_{110} = K_0 + K_1/4$
=>$K_1=4[FS^*_{110} - FS^*_{100}]$
For <111> directions, $\alpha_1 =1/\sqrt{3}, \alpha2 =1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III]=> $FS^*_{111} = K_0 + K_1/3 + K_2/27$

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- $FS^*_{111} = K_0 + K1/3 + K2/27 = FS^*_{100} + 4[FS^*_{110} - FS^*_{100}]/3 + K_2/27$
- $K_2 = [FS^*_{111} - FS^*_{100}] *27 - 36[FS^*_{110} - FS^*_{100}] = [27FS^*_{111} - 36FS^*_{110} + 9 FS^*_{100}]$

Substituting back in Original Equation, we have

$FS^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1)$

- $FS^* = FS^*_{100} + 4[FS^*_{110} - FS^*_{100}] (\sum\alpha^2_1 \alpha^2_2) + [27FS^*_{111} - 36FS^*_{110} + 9 FS^*_{100}](\prod\alpha^2_1)$

The values of FS^*_{100}, FS^*_{110}, FS^*_{111} can be taken from Compliance Constants TABLE

Fatigue Strength(FS)	$C_{11}/2$	$(C_{11}+C_{12})/2$	$(C_{11}+ C_{12}+4C_{44})/6$

$FS^*=K_0 + K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

Fatugue Strength-FS(GPa)	12	10	8

$FS^*=4.8 -3.1664(\sum\alpha_1\alpha_2)+4.8(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+7.2(\sum\alpha_1^3)-3.7024(\sum\alpha_1^2\alpha_2\alpha_3)-2.4(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-2.4(\sum\alpha_1^6)$

2.3.3 Ultimate Tensile Strenth(UTS),Generalized equation in terms of 3terms:

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Ultimate Tensile Strength-UTS(GPa)	30	25	20
Ultimate Tensile Strength(UTS)	$C_{11}/2$	$(C_{11}+C_{12})/2$	$(C_{11}+ C_{12}+4C_{44})/6$

$UTS^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1)$

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 = 1, \alpha_2 = 0, \alpha_3 = 0$ ….[I] => $UTS^*_{100} = K_0$

For <110> directions, $\alpha_1 = 1/\sqrt{2}, \alpha_2 = 1/\sqrt{2}, \alpha_3 = 0$….[II] => $UTS^*_{110} = K_0 + K_1/4$

=>$K_1 = 4[UTS^*_{110} - UTS^*_{100}]$

For <111> directions, $\alpha_1 = 1/\sqrt{3}, \alpha_2 = 1/\sqrt{3}, \alpha_3 = 1/\sqrt{3}$….[III]=> $UTS^*_{111} = K_0 + K_1/3 + K_2/27$

- $UTS^*_{111} = K_0 + K1/3 + K2/27 = UTS^*_{100} + 4[UTS^*_{110} - UTS^*_{100}]/3 + K_2/27$
- $K_2 = [UTS^*_{111} - UTS^*_{100}] *27 - 36[UTS^*_{110} - UTS^*_{100}] = [27UTS^*_{111} - 36UTS^*_{110} + 9 UTS^*_{100}]$

Substituting back in Original Equation, we have

$UTS^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1)$

- $UTS^* = UTS^*_{100} + 4[UTS^*_{110} - UTS^*_{100}] (\sum\alpha^2_1 \alpha^2_2) + [27UTS^*_{111} - 36UTS^*_{110} + 9 UTS^*_{100}](\prod\alpha^2_1)$

The values of UTS^*_{100}, UTS^*_{110}, UTS^*_{111} can be taken from Compliance Constants TABLE

Ultimate Tensile Strength(UTS)	$C_{11}/2$	$(C_{11}+C_{12})/2$	$(C_{11}+ C_{12}+4C_{44})/6$

$UTS^*=K_0 + K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

Ultimate Tensile Strength-UTS(GPa)	30	25	20

$UTS^*_{MODULUS}=12 -13.416(\sum\alpha_1\alpha_2)+12(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+18(\sum\alpha_1^3)+50.9433(\sum\alpha_1^2\alpha_2\alpha_3)-6(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-6(\sum\alpha_1^6)$

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2.3 Calculation Of Thermal Conductivity of Diamond by An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Thermal Conductivity	C v /3γρ)(C 11 +2C 12)/ρC44/ρ	C v /3γρ)(C 11 +C12)/ρC44/ρ	C v /3γρ)(C11)/ρC44/ρ
Thermal Conductivity(W/m-K)	2200	2000	1800

$TC^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1)$

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 =1, \alpha2 =0, \alpha_3=0$ ….[I] => $TC^*_{100} = K_0$
For <110> directions, $\alpha_1 =1/\sqrt{2}, \alpha2 =1/\sqrt{2}, \alpha_3=0$….[II] => $TC^*_{110} = K_0 + K_1/4$
=>$K_1=4[TC^*_{110} - TC^*_{100}]$
For <111> directions, $\alpha_1 =1/\sqrt{3}, \alpha2 =1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III]=> $TC^*_{111} = K_0 + K_1/3 + K_2/27$

- $TC^*_{111} = K_0 + K1/3 + K2/27 = TC^*_{100} + 4[TC^*_{110} - TC^*_{100}]/3 + K_2/27$
- $K_2 = [TC^*_{111} - TC^*_{100}] *27 - 36[TC^*_{110} - TC^*_{100}] = [27TC^*_{111} - 36TC^*_{110} +9 TC^*_{100}]$

Substituting back in Original Equation, we have
$TC^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1)$

- $TC^* = TC^*_{100} + 4[TC^*_{110} - TC^*_{100}] (\sum\alpha^2_1 \alpha^2_2) + [27TC^*_{111} - 36TC^*_{110} +9 TC^*_{100}](\prod\alpha^2_1)$

The values of TC^*_{100}, TC^*_{110}, TC^*_{111} can be taken from Compliance Constants TABLE

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Thermal Conductivity	$(Cv/3\gamma\rho)*(C_{11} +2C_{12})/\rho*C44/\rho$	$(Cv/3\gamma\rho)*(C_1+C_{12})/\rho*C_{44}/\rho$	$(Cv/3\gamma\rho)*(C_{11})/\rho*C_{44}/\rho$

$T^*_{CONDUCTIVITY}=K_0 +K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Thermal Conductivity(W/m-K)	2200	2000	1800

$T^*_{CONDUCTIVITY}=880 - 725.64(\sum\alpha_1\alpha_2)+880(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)++1320(\sum\alpha_1^3)+230.424(\sum\alpha_1^2\alpha_2\alpha_3)- 440(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-440(\sum\alpha_1^6)$

2.4 Calculation Of Vicker's Hardness of Diamond by An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Vicker's Hardness	$[C_{11}/C_{12}]^\alpha$ * $(C_{11}- C_{12})/C_{44}$	$[C_{11}/C_{44}]^\alpha$ * $(C_{11}+C_{12})/2C_{44}$	$[C_{11}/C_{12}]^\beta$ * $(C_{11}+C_{12})/C_{11}$
Vicker's Hardness(GPa)	70	75	80

$VH^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1)$

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0

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<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 = 1, \alpha 2 = 0, \alpha_3 = 0$ ….[I] => $VH^*_{100} = K_0$
For <110> directions, $\alpha_1 = 1/\sqrt{2}, \alpha 2 = 1/\sqrt{2}, \alpha_3 = 0$….[II] => $VH^*_{110} = K_0 + K_1/4$
=>$K_1 = 4[VH^*_{110} - VH^*_{100}]$
For <111> directions, $\alpha_1 = 1/\sqrt{3}, \alpha 2 = 1/\sqrt{3}, \alpha_3 = 1/\sqrt{3}$….[III]=> $VH^*_{111} = K_0 + K_1/3 + K_2/27$

- $VH^*_{111} = K_0 + K1/3 + K2/27 = VH^*_{100} + 4[VH^*_{110} - VH^*_{100}]/3 + K_2/27$
- $K_2 = [VH^*_{111} - VH^*_{100}] *27 - 36[VH^*_{110} - VH^*_{100}] = [27VH^*_{111} - 36VH^*_{110} + 9\ VH^*_{100}]$

Substituting back in Original Equation, we have
$VH^* = K_0 + K_1 (\sum \alpha^2_1\ \alpha^2_2) + K_2 (\prod \alpha^2_1)$

- $VH^* = VH^*_{100} + 4[VH^*_{110} - VH^*_{100}] (\sum \alpha^2_1\ \alpha^2_2) + [27VH^*_{111} - 36VH^*_{110} + 9\ VH^*_{100}](\prod \alpha^2_1)$

The values of VH^*_{100}, VH^*_{110}, VH^*_{111} can be taken from Compliance Constants TABLE

Vicker's Hardness	$[C_{11}/C_{12}]^{\alpha}$ * $(C_{11} - C_{12})/C_{44}$	$[C_{11}/C_{44}]^{\alpha}$ * $(C_{11}+C_{12})/2C_{44}$	$[C_{11}/C_{12}]^{\beta}$ * $(C_{11}+C_{12})/C_{11}$

$V^*_{HARDNESS} = K_0 + K_1(\sum \alpha_1\alpha_2) + K_2(\sum \alpha_1^2) + K_3(\prod \alpha_1) + K_4(\sum \alpha_1^2\alpha_2^2) + + K_5(\sum \alpha_1^3) + K_6(\sum \alpha_1^2\alpha_2\alpha_3) + K_7(\sum \alpha_1^4) + K_8(\sum \alpha_1^4\alpha_2^2) + K_9(\sum \alpha_1^6)$

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Vicker's Hardness(GPa)	70	75	80

$V^*_{HARDNESS} = 28 + 0.696(\sum \alpha_1\alpha_2) + 28(\sum \alpha_1^2) + 2(\prod \alpha_1) + 2(\sum \alpha_1^2\alpha_2^2) + 42(\sum \alpha_1^3) - 15.405(\sum \alpha_1^2\alpha_2\alpha_3) - 14(\sum \alpha_1^4) + 1(\sum \alpha_1^4\alpha_2^2) - 14(\sum \alpha_1^6)$

2.5 Calculation Of Longitudinal and Transverse Mode of Diamond by An Expansion Into Direction Cosines $\alpha_1, \alpha_2, \alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Speed of Sound(m/s) $*10^3$	12	11.5	11
Mean Free Time(s) $*10^{-12}$	1.0	0.8	0.6

Expression of Longitudinal Mode,Transverse Mode Velocities in terms of compliance constants Table

S.No	Crystallographic Direction	Longitudinal Mode of Oscillation, V_L	Transverse Mode of Oscillation, V_T
1.	$V_{[100]}$	$\sqrt{(C_{11}/\rho)}$	$\sqrt{(C_{44}/\rho)}$
2.	$V_{[110]}$	$\sqrt{(C_{11} + C_{12} + 2C_{44})/\rho}$	$\sqrt{(C_{11} - C_{12})/\rho}$
3.	$V_{[111]}$	$\sqrt{(C_{11} + 2C_{12} + 4C_{44})/3\rho}$	$\sqrt{(C_{11} - C12 + C_{44})/3\rho}$

Generalized equation in terms of 3terms:
$V^*_{L\&T} = K_0 + K_1 (\sum \alpha^2_1\ \alpha^2_2) + K_2 (\prod \alpha^2_1)$

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 = 1, \alpha 2 = 0, \alpha_3 = 0$ ….[I] => $V^*_{L\&T100} = K_0$
For <110> directions, $\alpha_1 = 1/\sqrt{2}, \alpha 2 = 1/\sqrt{2}, \alpha_3 = 0$….[II] => $V^*_{L\&T110} = K_0 + K_1/4$
=>$K_1 = 4[V^*_{L\&T110} - V^*_{L\&T100}]$

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For <111> directions, $\alpha_1 = 1/\sqrt{3}$, $\alpha 2 = 1/\sqrt{3}$, $\alpha_3 = 1/\sqrt{3}$….[III]=> $V^*_{L\&T111} = K_0 + K_1/3 + K_2/27$

- $V^*_{L\&T111} = K_0 + K1/3 + K2/27 = V^*_{L\&T100} + 4[V^*_{L\&T110} - V^*_{L\&T100}]/3 + K_2/27$
- $K_2 = [V^*_{L\&T\ 111} - V^*_{L\&T\ 100}] *27 - 36[V^*_{L\&T\ 110} - V^*_{L\&T\ 100}] = [27V^*_{L\&T\ 111} - 36V^*_{L\&T\ 110} + 9\ V^*_{L\&T\ 100}]$

Substituting back in Original Equation, we have

$V^*_{L\&T} = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$

- $V^*_{L\&T} = V^*_{L\&T\ 100} + 4[V^*_{L\&T\ 110} - V^*_{L\&T\ 100}] (\sum\alpha^2_1\ \alpha^2_2) + [27V^*_{L\&T\ 111} - 36V^*_{L\&T\ 110} + 9\ V^*_{L\&T\ 100}](\prod\alpha^2_1)$

The values of $V^*_{L\&T\ 100,}$ $V^*_{L\&T\ 110,}$ $V^*_{L\&T\ 111}$ can be taken from Compliance Constants TABLE

$V^*_{L\&T\ SPEED} = K_0 + K_1(\sum\alpha_1\alpha_2) + K_2(\sum\alpha_1^2) + K_3(\prod\alpha_1) + K_4(\sum\alpha_1^2\alpha_2^2) + + K_5(\sum\alpha_1^3) + K_6(\sum\alpha_1^2\alpha_2\alpha_3) + K_7(\sum\alpha_1^4) + K_8(\sum\alpha_1^4\alpha_2^2) + K_9(\sum\alpha_1^6)$

$V^*_{L\&T\ SPEED} = 4.8 - 2.96(\sum\alpha_1\alpha_2) + 4.8(\sum\alpha_1^2) + 2(\prod\alpha_1) + 2(\sum\alpha_1^2\alpha_2^2) + 7.2(\sum\alpha_1^3) - 0.371(\sum\alpha_1^2\alpha_2\alpha_3) - 2.4(\sum\alpha_1^4) + 1(\sum\alpha_1^4\alpha_2^2) - 2.4(\sum\alpha_1^6)$

2.6 Calculation Of Mean Free Path of Diamond by An Expansion Into Direction Cosines $\alpha_1, \alpha_2, \alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Mean Free Time(s) $*10^{-12}$	1.0	0.8	0.6
Mean Free Time(s)	$\tau \sim 1/\gamma C44$	$\tau \sim 1/\gamma C44$	$\tau \sim 1/\gamma C44$

Mean Free Time is an isotropic property.

$T^*_{MEAN\ FREE\ TIME} = K_0 + K_1(\sum\alpha_1\alpha_2) + K_2(\sum\alpha_1^2) + K_3(\prod\alpha_1) + K_4(\sum\alpha_1^2\alpha_2^2) + + K_5(\sum\alpha_1^3) + K_6(\sum\alpha_1^2\alpha_2\alpha_3) + K_7(\sum\alpha_1^4) + K_8(\sum\alpha_1^4\alpha_2^2) + K_9(\sum\alpha_1^6)$

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Mean Free Time(s) $*10^{-12}$	1.0	0.8	0.6

$T^*_{MEAN\ FREE\ TIME} = 0.4 - 0.5472(\sum\alpha_1\alpha_2) + 0.4(\sum\alpha_1^2) + 2(\prod\alpha_1) + 2(\sum\alpha_1^2\alpha_2^2) + 0.6(\sum\alpha_1^3) - 2.733(\sum\alpha_1^2\alpha_2\alpha_3) - 0.2(\sum\alpha_1^4) + 1(\sum\alpha_1^4\alpha_2^2) - 0.2(\sum\alpha_1^6)$

2.7Calculation Of UV,Visible Optical Adsorption of Diamond by An Expansion Into Direction Cosines $\alpha_1, \alpha_2, \alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
UV Optical Adsorption	$\alpha_{UV,[100]} = (C_{11}+C_{12})/Eg^2$	$\alpha_{UV,[110]} = (C_{11}+C_{44})/Eg^2$	$\alpha_{UV,[111]} = (C_1+C_{44})/Eg^2$
Visible Optical Adsorption	$\alpha_{VISIBLE,[100]} = (C_1+C_{44})/Eg^2$	$\alpha_{VISIBLE,[110]} = (C_{11}+C_{44})/Eg^2$	$\alpha_{VISIBLE,[111]} = (C_{11}+C_{44})/Eg^2$
UV Optical Absorption cm^{-1}	0.003	0.0008	0.0002
Visible Optical Absorption $cm^{-1} *10^{-9}$	5	4	3

Generalized equation in terms of 3terms:

$UV\text{-}VIS_{OA}^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$,V is UV,Visible Optical Adsorption

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 = 1$, $\alpha 2 = 0$, $\alpha_3 = 0$ ….[I] => $UV\text{-}VIS_{OA}^*{}_{100} = K_0$

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For <110> directions, $\alpha_1 = 1/\sqrt{2}$, $\alpha 2 = 1/\sqrt{2}$, $\alpha_3 = 0$….[II] => $UV\text{-}VIS_{OA}{}^*_{110} = K_0 + K_1/4$
$=> K_1 = 4[UV\text{-}VIS_{OA}{}^*_{110} - UV\text{-}VIS_{OA}{}^*_{100}]$
For <111> directions, $\alpha_1 = 1/\sqrt{3}$, $\alpha 2 = 1/\sqrt{3}$, $\alpha_3 = 1/\sqrt{3}$….[III]=> $UV\text{-}VIS_{OA}{}^*_{111} = K_0 + K_1/3 + K_2/27$

- $UV\text{-}VIS_{OA}{}^*_{111} = K_0 + K1/3 + K2/27 = UV\text{-}VIS_{OA}{}^*_{100} + 4[UV\text{-}VIS_{OA}{}^*_{110} - UV\text{-}VIS_{OA}{}^*_{100}]/3 + K_2/27$
- $K_2 = [UV\text{-}VIS_{OA}{}^*_{111} - UV\text{-}VIS_{OA}{}^*_{100}] *27 - 36[UV\text{-}VIS_{OA}{}^*_{110} - UV\text{-}VIS_{OA}{}^*_{100}] = [27UV\text{-}VIS_{OA}{}^*_{111} - 36UV\text{-}VIS_{OA}{}^*_{110} + 9\ UV\text{-}VIS_{OA}{}^*_{100}]$

Substituting back in Original Equation, we have
$UV\text{-}VIS_{OA}{}^* = K_0 + K_1 (\sum\alpha^2{}_1\ \alpha^2{}_2) + K_2 (\prod\alpha^2{}_1)$

- $UV\text{-}VIS_{OA}{}^* = UV\text{-}VIS_{OA}{}^*_{100} + 4[UV\text{-}VIS_{OA}{}^*_{110} - UV\text{-}VIS_{OA}{}^*_{100}] (\sum\alpha^2{}_1\ \alpha^2{}_2) + [27UV\text{-}VIS_{OA}{}^*_{111} - 36UV\text{-}VIS_{OA}{}^*_{110} + 9\ UV\text{-}VIS_{OA}{}^*_{100}](\prod\alpha^2{}_1)$

The values of $V^*_{100,}$ $V^*_{110,}$ V^*_{111} can be taken from Compliance Constants TABLE

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
UV Optical Adsorption	$\alpha_{UV,[100]}=(C_{11}+C_{12})/Eg^2$	$\alpha_{UV,[110]}=(C_{11}+C_{44})/Eg^2$	$\alpha_{UV,[111]}=(C_1+C_{44})/Eg^2$
Visible Optical Adsorption	$\alpha_{VISIBLE,[100]} = (C_1+C_{44})/Eg^2$	$\alpha_{VISIBLE,[110]}=(C_{11}+C_{44})/Eg^2$	$\alpha_{VISIBLE,[111]}=(C_{11}+C_{44})/Eg^2$

$UV_{OA}{}^*=K_0$
$+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1{}^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1{}^2\alpha_2{}^2)++K_5(\sum\alpha_1{}^3)+K_6(\sum\alpha_1{}^2\alpha_2\alpha_3)+K_7(\sum\alpha_1{}^4)+K_8(\sum\alpha_1{}^4\alpha_2{}^2)+K_9(\sum\alpha_1{}^6)$

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
UV Optical Absorption cm^{-1}	0.003	0.0008	0.0002

$UV_{OA}{}^*=0.0012 -1.003(\sum\alpha_1\alpha_2)+0.0012(\sum\alpha_1{}^2)+2(\prod\alpha_1)+2(\sum\alpha_1{}^2\alpha_2{}^2)+0.0018(\sum\alpha_1{}^3)-1.9932(\sum\alpha_1{}^2\alpha_2\alpha_3)-0.0006(\sum\alpha_1{}^4)+1(\sum\alpha_1{}^4\alpha_2{}^2)-0.0006(\sum\alpha_1{}^6)$

$VIS_{OA}{}^*=K_0$
$+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1{}^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1{}^2\alpha_2{}^2)++K_5(\sum\alpha_1{}^3)+K_6(\sum\alpha_1{}^2\alpha_2\alpha_3)+K_7(\sum\alpha_1{}^4)+K_8(\sum\alpha_1{}^4\alpha_2{}^2)+K_9(\sum\alpha_1{}^6)$

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Visible Optical Absorption $cm^{-1} *10^{-9}$	5	4	3

$VIS_{OA}{}^*=42 -3.736(\sum\alpha_1\alpha_2)+2(\sum\alpha_1{}^2)+2(\prod\alpha_1)+2(\sum\alpha_1{}^2\alpha_2{}^2)+3(\sum\alpha_1{}^3)+0.7587(\sum\alpha_1{}^2\alpha_2\alpha_3)-1(\sum\alpha_1{}^4)+1(\sum\alpha_1{}^4\alpha_2{}^2)-1(\sum\alpha_1{}^6)$

2.4 Calculation Of Surface and Cleavege Energy of Diamond by An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Surface Energy,J/m^2	$C_{11}/2$	$(C_{11}+ C_{12}+2C_{44})/4$	$(C_{11}+ 2C_{12}+4C_{44})/6$
Cleavege Energy,J/m^2	C_{11}	$(C_{11}+ C_{12}+2C_{44})/2$	$(C_{11}+2\ C_{12}+4C_{44})/3$
Surface Energy,J/m^2	5.3	3.7	2.3
Cleavege Energy,J/m^2	10	7	3.4

Generalized equation in terms of 3terms:

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$

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Surface Energy,J/m^2	$C_{11}/2$	$(C_{11}+ C_{12}+2C_{44})/4$	$(C_{11}+ 2C_{12}+4C_{44})/6$

$SE^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$ SE is Surface and Cleavege Energy

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 =1, \alpha2 =0, \alpha_3=0$ ….[I] => $SE^*_{100} = K_0$
For <110> directions, $\alpha_1 =1/\sqrt{2}, \alpha2 =1/\sqrt{2}, \alpha_3=0$….[II] => $SE^*_{110} = K_0 + K_1/4$
=>$K_1=4[SE^*_{110} - SE^*_{100}]$
For <111> directions, $\alpha_1 =1/\sqrt{3}, \alpha2 =1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III]=> $SE^*_{111} = K_0 + K_1/3 + K_2/27$

- $SE^*_{111} = K_0 + K1/3 + K2/27 = SE^*_{100} + 4[SE^*_{110} - SE^*_{100}]/3 + K_2/27$
- $K_2 = [SE^*_{111} - SE^*_{100}] *27 - 36[SE^*_{110} - SE^*_{100}] = [27SE^*_{111} - 36SE^*_{110} +9SE^*_{100}]$

Substituting back in Original Equation, we have
$SE^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$

- $SE^* = SE^*_{100} + 4[SE^*_{110} - SE^*_{100}] (\sum\alpha^2_1\ \alpha^2_2) + [27SE^*_{111} - 36SE^*_{110} +9\ SE^*_{100}](\prod\alpha^2_1)$

The values of $SE^*_{100,}\ SE^*_{110,}\ SE^*_{111}$ can be taken from Compliance Constants TABLE

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Surface Energy,J/m^2	$C_{11}/2$	$(C_{11}+ C_{12}+2C_{44})/4$	$(C_{11}+ 2C_{12}+4C_{44})/6$
Cleavege Energy,J/m^2	C_{11}	$(C_{11}+ C_{12}+2C_{44})/2$	$(C_{11}+2\ C_{12}+4C_{44})/3$
Surface Energy,J/m^2	5.3	3.7	2.3
Cleavege Energy,J/m^2	10	7	3.4

Generalized equation in terms of 3terms:
$CE^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$ CE is Cleavege Energy

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 =1, \alpha2 =0, \alpha_3=0$ ….[I] => $CE^*_{100} = K_0$
For <110> directions, $\alpha_1 =1/\sqrt{2}, \alpha2 =1/\sqrt{2}, \alpha_3=0$….[II] => $CE^*_{110} = K_0 + K_1/4$
=>$K_1=4[CE^*_{110} - CE^*_{100}]$
For <111> directions, $\alpha_1 =1/\sqrt{3}, \alpha2 =1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III]=> $CE^*_{111} = K_0 + K_1/3 + K_2/27$

- $CE^*_{111} = K_0 + K1/3 + K2/27 = CE^*_{100} + 4[CE^*_{110} - CE^*_{100}]/3 + K_2/27$
- $K_2 = [CE^*_{111} - CE^*_{100}] *27 - 36[CE^*_{110} - CE^*_{100}] = [27CE^*_{111} - 36CE^*_{110} +9CE^*_{100}]$

Substituting back in Original Equation, we have
$CE^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$

- $CE^* = CE^*_{100} + 4[CE^*_{110} - CE^*_{100}] (\sum\alpha^2_1\ \alpha^2_2) + [27CE^*_{111} - 36CE^*_{110} +9CE^*_{100}](\prod\alpha^2_1)$

The values of $CE^*_{100,}\ CE^*_{110,}\ CE^*_{111}$ can be taken from Compliance Constants TABLE

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Surface Energy,J/m^2	5.3	3.7	2.3

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$SE^*=K_0 +K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$SE^*=2.12 \quad -4.906(\sum\alpha_1\alpha_2)+2.12(\sum\alpha_1^2)-13.44(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+3.18(\sum\alpha_1^3)-+5.7205(\sum\alpha_1^2\alpha_2\alpha_3)-1.06(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-1.06(\sum\alpha_1^6)$

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Cleavege Energy,J/m^2	10	7	3.4

$CE^*=K_0 +K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$CE^*=4 \quad -6.472(\sum\alpha_1\alpha_2)+4(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+6(\sum\alpha_1^3)-+5.366(\sum\alpha_1^2\alpha_2\alpha_3)-2(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-2(\sum\alpha_1^6)$

2.5 Calculation Of Change in Resistivity of Diamond by An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Property Of Diamond	$\xi_{<100>}$	$\xi_{<110>}$	$\xi_{<111>}$
Change in Resistivity,$\Delta\rho$	$\Delta\rho_{[100]}=\pi_{11}c_{11}\epsilon_{xx}+2\pi_{12}c_{12}\epsilon_{xx}$	$\Delta\rho_{[110]}=\pi_{11(}c_{11+}c_{12+2}c_{14)/2}\epsilon_{xx}+\pi_{12(}c_{11+}c_{12-2}c_{44)/2}\epsilon_{xx+}\pi_{44}c_{44}\epsilon_{xy}$	$\Delta\rho_{[110]}=\pi_{11(}c_{11+2}c_{12+4}c_{44)/3}\epsilon_{xx}+\pi_{12(}c_{11+2}c_{12-4}c_{44)/3}\epsilon_{xx}+c_{11+2}c_{12-4}c_{44)/3}\epsilon_{yy)}$

Generalized equation in terms of 3terms:

$CR^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$ CR is Change in Resistivity

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

For <100> directions, $\alpha_1 =1, \alpha2 =0, \alpha_3=0$ ….[I] => $CR^*_{100} = K_0$

For <110> directions, $\alpha_1 =1/\sqrt{2}, \alpha2 =1/\sqrt{2}, \alpha_3=0$….[II] => $CR^*_{110} = K_0 + K_1/4$

=>$K_1=4[CR^*_{110} - CR^*_{100}]$

For <111> directions, $\alpha_1 =1/\sqrt{3}, \alpha2 =1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III]=> $CR^*_{111} = K_0 + K_1/3 + K_2/27$

- $CR^*_{111} = K_0 + K1/3 + K2/27 = CR^*_{100} + 4[CR^*_{110} - CR^*_{100}]/3 + K_2/27$
- $K_2 = [CR^*_{111} - CR^*_{100}] *27 - 36[CR^*_{110} - CR^*_{100}] = [27CR^*_{111} - 36CR^*_{110} +9CR^*_{100}]$

Substituting back in Original Equation, we have

$CR^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1)$

- $CR^* = CR^*_{100} + 4[CR^*_{110} - CR^*_{100}] (\sum\alpha^2_1\ \alpha^2_2) + [27CR^*_{111} - 36CR^*_{110} +9CR^*_{100}](\prod\alpha^2_1)$

The values of $CR^*_{100,}$ $CR^*_{110,}$ CR^*_{111} can be taken from Compliance Constants TABLE

Change in Resistivity,$\Delta\rho$	$\Delta\rho_{[100]}=\pi_{11}c_{11}\epsilon_{xx}+2\pi_{12}c_{12}\epsilon_{xx}$	$\Delta\rho_{[110]}=\pi_{11(}c_{11+}c_{12+2}c_{14)/2}\epsilon_{xx}+\pi_{12(}c_{11+}c_{12-2}c_{44)/2}\epsilon_{xx+}\pi_{44}c_{44}\epsilon_{xy}$	$\Delta\rho_{[110]}=\pi_{11(}c_{11+2}c_{12+4}c_{44)/3}\epsilon_{xx}+\pi_{12(}c_{11+2}c_{12-4}c_{44)/3}\epsilon_{xx}+c_{11+2}c_{12-4}c_{44)/3}\epsilon_{yy)}$

III. Genralised Estimation of Goss and Cube Texture Quantification of YBCO,Ni Based,MgB_2,NbTi,BSCCO,FeSe,LaFeAsO Superconductors By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

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Crystallographic Directios [uvw]	YBCO Goss and Cube Texture %	Ni - Based Goss and Cube Texture %	MgB_2 Goss and Cube Texture %	NbTi Goss and Cube Texture %	BSCCO Goss and Cube Texture %	FeSe Goss and Cube Texture %	LaFeAsO Goss and Cube Texture %
<100>	0.6 & 1	0.7 & 1.0	0.5 & 0.6	0.5 & 0.8	0.55&.75	0.65 & 0.85	0.6 & 0.9
<110>	0.25 & 0.4	0.2 & 0.5	0.2 & 0.4	0.3 & 0.3	0.2 &0.3	0.15 & 0.25	0.25 &0.35
<111>	0.05 & 0.1	0.1 & 0.2	0.1 & 0.05	0.15 &0.2	0.15&1.0	0.05 & 0.1	0.1 & 0.15

1.1 Standard Equation:

$$\xi^*=K_0 + K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)+K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$$

$$\xi^*=K_+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$$

[uvw]	A	B	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

/**********

Running Comptational Code, for getting standard equation using p1,p2,p3 for above properties

p1=*k*0+*k*2+*k*5+*k*7+*k*9

p2=*k*0+0.5*k*1+*k*2+0.25*k*4+0.706*k*5+0.5*k*7+0.125*k*8+0.25*k*9

p3=*k*0+*k*1+*k*2+0.1923*k*3+0.333*k*4+0.5772k5+0.5772*k*6+0.333*k*7+0.3335*k*8+0.192k9

*k*0=2p1/5;*k*2=2p1/5;*k*5=3p1/5;*k*7=*k*9 = -p1/5;*k*4=2,*k*8=1;

*k*1=2*(p2 -*k*0-*k*2-0.25k4-0.706*k*5-0.5*k*7-0.25*k*9);*k*3=2

k6=5.2(p3-*k*0-*k*1 -*k*2-0.1923k3-0.3333*k*4 -0.5772*k*5-0.3333*k*7-0.333*k*8-0.1924*k*9)

p1=70;p2=75;p3=80, give values of k1,...k9

**********/

YBCO SuperConductor:

$$\xi^*=K_+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$$

$$\xi^*_{GOSS\ TEXTURE}=0.24.-1.71(\sum\alpha_1\alpha_2)+0.24(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.36(\sum\alpha_1^3)+0.79(\sum\alpha_1^2\alpha_2\alpha_3)-0.12(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.12(\sum\alpha_1^6)$$

$$\xi^*_{CUBE\ TEXTURE}=0.4.-2.35(\sum\alpha_1\alpha_2)+0.4(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.6(\sum\alpha_1^3)+0.81(\sum\alpha_1^2\alpha_2\alpha_3)-0.2(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.2(\sum\alpha_1^6)$$

Ni-Based SuperConductor:

$\xi^{*}=K_{+}K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$\xi^{*}_{GOSS\ \ TEXTURE}=0.28.-2.1(\sum\alpha_1\alpha_2)+0.28(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.42(\sum\alpha_1^3)+6.81(\sum\alpha_1^2\alpha_2\alpha_3)-0.14(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.14(\sum\alpha_1^6)$

$\xi^{*}_{CUBE\ \ TEXTURE}=0.4.-2.15(\sum\alpha_1\alpha_2)+0.4(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.6(\sum\alpha_1^3)+1.14(\sum\alpha_1^2\alpha_2\alpha_3)-0.2(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.2(\sum\alpha_1^6)$

MgB_2 SuperConductor:

$\xi^{*}=K_{+}K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$\xi^{*}_{GOSS\ \ TEXTURE}=0.2.-1.67(\sum\alpha_1\alpha_2)+0.2(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.3(\sum\alpha_1^3)+0.14(\sum\alpha_1^2\alpha_2\alpha_3)-0.1(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.1(\sum\alpha_1^6)$

$\xi^{*}_{CUBE\ \ TEXTURE}=0.24.-1.49(\sum\alpha_1\alpha_2)+0.24(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.36(\sum\alpha_1^3)-2.49(\sum\alpha_1^2\alpha_2\alpha_3)-0.12(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.12(\sum\alpha_1^6)$

NbTi SuperConductor:

$\xi^{*}=K_{+}K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$\xi^{*}_{GOSS\ \ TEXTURE}=0.2.-1.47(\sum\alpha_1\alpha_2)+0.2(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.3(\sum\alpha_1^3)-1.48(\sum\alpha_1^2\alpha_2\alpha_3)-0.1(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.1(\sum\alpha_1^6)$

$\xi^{*}_{CUBE\ \ TEXTURE}=0.32.-2.12(\sum\alpha_1\alpha_2)+0.32(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.48(\sum\alpha_1^3)-+4(\sum\alpha_1^2\alpha_2\alpha_3)-0.16(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.16(\sum\alpha_1^6)$

BSCCO SuperConductor:

$\xi^{*}=K_{+}K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$\xi^{*}_{GOSS\ \ TEXTURE}=0.22.-2.295(\sum\alpha_1\alpha_2)+0.22(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.33(\sum\alpha_1^3)+8.875(\sum\alpha_1^2\alpha_2\alpha_3)-0.11(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.11(\sum\alpha_1^6)$

$\xi^{*}_{CUBE\ \ TEXTURE}=0.3.-2.0104(\sum\alpha_1\alpha_2)+0.3(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.45(\sum\alpha_1^3)+1.032(\sum\alpha_1^2\alpha_2\alpha_3)-0.15(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.15(\sum\alpha_1^6)$

FeSe SuperConductor:

$\xi^{*}=K_{+}K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$\xi^{*}_{GOSS\ \ TEXTURE}=0.26.2.09968(\sum\alpha_1\alpha_2)+0.26(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.39(\sum\alpha_1^3)+4.679(\sum\alpha_1^2\alpha_2\alpha_3)-0.13(\sum\alpha_1^4)+1(\sum2\alpha_1^4\alpha_2^2)-0.13(\sum\alpha_1^6)$

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$\xi^*_{CUBE\ TEXTURE}$=0.34.-2.24512($\sum\alpha_1\alpha_2$)+0.34($\sum\alpha_1^2$)+2($\prod\alpha_1$)+2($\sum\alpha_1^2\alpha_2^2$)+0.51($\sum\alpha_1^3$)+7.02964($\sum\alpha_1^2\alpha_2\alpha_3$)-0.17($\sum\alpha_1^4$)+1($\sum\alpha_1^4\alpha_2^2$)-0.17($\sum\alpha_1^6$)

LaFeAsO SuperConductor:

ξ^*=$K_+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$\xi^*_{GOSS\ TEXTURE}$=0.24.-1.79632($\sum\alpha_1\alpha_2$)+0.24($\sum\alpha_1^2$)+2($\prod\alpha_1$)+2($\sum\alpha_1^2\alpha_2^2$)+0.36($\sum\alpha_1^3$)+4.21742($\sum\alpha_1^2\alpha_2\alpha_3$)-0.12($\sum\alpha_1^4$)+1($\sum\alpha_1^4\alpha_2^2$)-0.12($\sum\alpha_1^6$)

$\xi^*_{CUBE\ TEXTURE}$=0.36.-2.45008($\sum\alpha_1\alpha_2$)+0.36($\sum\alpha_1^2$)+2($\prod\alpha_1$)+2($\sum\alpha_1^2\alpha_2^2$)+0.54($\sum\alpha_1^3$)+6.99968($\sum\alpha_1^2\alpha_2\alpha_3$)-0.18($\sum\alpha_1^4$)+1($\sum\alpha_1^4\alpha_2^2$)-0.18($\sum\alpha_1^6$)

IVGenralisedEstimationKinematicandDynamicViscosityofAluminium,Copper,Iron,Chromium, Molybenum,Titanium,Magnesium,ZincByAn Expansion Into Direction Cosines α1,α2,α3 With Respect To The Crystal Axes

In this present article, kinematic,Dynamic Viscosity of Copper,Aluminium,Iron,Chromium,Molybenum,Titanium,Magnesium,Zinc of is expressed by an expansion into Direction Cosines α_1, α2, α3 with respect to the crystal axes. The General Equation kinematic,Dynamic Viscosity of Copper,AluminiumIron,Chromium,Molybenum,Titanium,Magnesium,Zinc can be used to determine their values at <100>, <110>, <111> directions respectively. In the present article kinematic,Dynamic Viscosity of Copper,Aluminium is determined at <100>, <110>, <111> directions respectively. The Equation can be generalized to include any element or compound with anisotropic properties.Aisotropic Properties are those properties of which vary with crystal direction is different at <100>,<110>,<111> directions.Kinematic,Dynamic Viscosity of Copper,Aluminium,Iron,Chromium,Molybenum,Titanium,Magnesium,Zinc. Kinematic,Dynamic Viscosity of Copper,Aluminium ,Iron,Chromium,Molybenum,Titanium,Magnesium,Zinc can be expressed as an expansion into direction cosines $\alpha_1,\alpha_2,\alpha_3$ with respect to the crystal axes.In the present article, consideration is made up to three terms.

1.1 Standard Equation:

$\xi^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)+K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

ξ^*=$K_+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

[uvw]	A	B	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

From Ref[6]

S.No	Dynamic Viscosity (Pa-s) of Copper	Kinematic Viscocity(m^2/s) of Copper(m^2/sec)	Crystalllographic Directions<uvw>

1.	1.2	1.1	<100>
2.	1.5	1.3	<110>
3.	1.3	1.2	<111>

S.No	Dynamic Viscosity (Pa-s) of Aluminium	Kinematic Viscocity(m^2/s) of Aluminium(m^2/sec)	Crystalllographic Directions<uvw>
1.	0.9	0.8	<100>
2.	1.1	1.0	<110>
3.	1.0	0.9	<111>

S.No	Dynamic Viscosity (Pa-s) of Iron	Kinematic Viscocity(m^2/s) of Iron(m^2/sec)	Crystalllographic Directions<uvw>
1.	3.2	0.46	<100>
2.	3.0	0.43	<110>
3.	1.0	0.4	<111>

S.No	Dynamic Viscosity (Pa-s) of Chromium	Kinematic Viscocity(m^2/s) of Chromium(m^2/sec)	Crystalllographic Directions<uvw>
1.	2.4	0.33	<100>
2.	2.2	0.31	<110>
3.	2.0	0.28	<111>

S.No	Dynamic Viscosity (Pa-s) of Molybenum	Kinematic Viscocity(m^2/s) of Molybenum(m^2/sec)	Crystalllographic Directions<uvw>
1.	3.2	0.31	<100>
2.	3.0	0.29	<110>
3.	2.8	0.27	<111>

S.No	Dynamic Viscosity (Pa-s) of Titanium	Kinematic Viscocity(m^2/s) of Titanium(m^2/sec)	Crystalllographic Directions<uvw>
1.	1.9	0.42	<100>
2.	1.7	0.38	<110>
3.	1.3	0.33	<111>

S.No	Dynamic Viscosity (Pa-s) of Magnesium	Kinematic Viscocity(m^2/s) of Magnesium(m^2/sec)	Crystalllographic Directions<uvw>
1.	0.025	0.017	<100>
2.	0.027	0.018	<110>
3.	0.026	0.019	<111>

S.No	Dynamic Viscosity (Pa-s) of Zinc	Kinematic Viscocity(m^2/s) of Zinc(m^2/sec)	Crystalllographic Directions<uvw>
1.	1.6	0.24	<100>
2.	1.5	0.23	<110>
3.	1.4	0.21	<111>

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4.1 Calculation Of Dynamic Viscosity and Kinematic viscosity of Copper By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

[uvw]	a	b	c	α_1	α_2	α_3	Y
<100>	0	90^0	90^0	1	0	0	K_0
<110>	45^0	45^0	90^0	$1/\sqrt{2}$	$1/\sqrt{2}$	0	$K_0 + K_1/4$
<111>	54.7^0	54.7^0	54.7^0	$1/\sqrt{3}$	$1/\sqrt{3}$	$1/\sqrt{3}$	$K_0 + K_1/3 + K_2/27$

$\xi_{DV}^*=K_0 + K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)++K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi_{KV}^*=K_0 + K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)+K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi^*=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

S.No	Dynamic Viscosity (Pa-s) of Copper	Kinematic Viscocity(m^2/s) of Copper(m^2/sec)	Crystalllographic Directions<uvw>
1.	1.2	1.1	<100>
2.	1.5	1.3	<110>
3.	1.3	1.2	<111>

/**
Running Comptational Code, for getting standard equation using p1,p2,p3 for above properties
p1=*k*0+*k*2+*k*5+*k*7+*k*9
p2=*k*0+0.5*k*1+*k*2+0.25*k*4+0.706*k*5+0.5*k*7+0.125*k*8+0.25*k*9
p3=*k*0+*k*1+*k*2+0.1923*k*3+0.333*k*4+0.5772k5+0.5772*k*6+0.333*k*7+0.3335*k*8+0.192k9
***k*0=2p1/5;*k*2=2p1/5;*k*5=3p1/5;*k*7=*k*9 = -p1/5;*k*4=2,*k*8=1;**
***k*1=2*(p2 -*k*0-*k*2-0.25k4-0.706*k*5-0.5*k*7-0.25*k*9);*k*3=2**
k6=5.2(p3-*k*0-*k*1 -*k*2-0.1923k3-0.3333*k*4 -0.5772*k*5-0.3333*k*7-0.333*k*8-0.1924*k*9)
p1=1.2;p2=1.5;p3=1.3, give values of k1,...k9
**/

Dynamic Viscosity Of Copper(μPa·s)	1.2	1.5	1.3
Kinematic Viscosity Of Copper(m^2/sec)	1.1	1.3	1.2

$\xi^*_{DVCu}=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$\xi^*_{DVCu}=0.48-0.304(\sum\alpha_1\alpha_2)+0.48(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.72(\sum\alpha_1^3)-8.876(\sum\alpha_1^2\alpha_2\alpha_3)-0.24(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.24(\sum\alpha_1^6)$

$\xi^*_{KVCu}=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$^*_{KVCu}=0.44-0.772(\sum\alpha_1\alpha_2)+0.44(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.66(\sum\alpha_1^3)+0.657(\sum\alpha_1^2\alpha_2\alpha_3)-0.22(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.22(\sum\alpha_1^6)$

4.2 Calculation Of Dynamic Viscosity and Kinematic viscosity of Aluminium By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

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$\xi_{DV}^{*}=K_0 + K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)++K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi_{KV}^{*}=K_0 + K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)+K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi^{*}=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

S.No	Dynamic Viscosity (Pa-s) of Aluminium	Kinematic Viscocity(m^2/s) of Aluminium(m^2/sec)	Crystalllographic Directions<uvw>
1.	0.9	0.8	<100>
2.	1.1	1.0	<110>
3.	1.0	0.9	<111>

Dynamic Viscosity Of Aluminium(μPa·s)	0.9	1.1	1.0
Kinenamic Viscosity Of Aluminium(m^2/sec)	0.8	1.0	0.9

$\xi^{*}_{DVAl}=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$\xi^{*}_{DVAl}=0.36-0.73(\sum\alpha_1\alpha_2)+0.36(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.54(\sum\alpha_1^3)-1.7245(\sum\alpha_1^2\alpha_2\alpha_3)-0.18(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.18(\sum\alpha_1^6)$

$\xi^{*}_{KVAl}=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

$\xi^{*}_{KVAl}=0.32-0.6776(\sum\alpha_1\alpha_2)+0.32(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.48(\sum\alpha_1^3)-3.375(\sum\alpha_1^2\alpha_2\alpha_3)-0.16(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.16(\sum\alpha_1^6)$

4.3 Calculation Of Dynamic Viscosity and Kinematic viscosity of Iron By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

$\xi_{DV}^{*}=K_0 + K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)++K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi_{KV}^{*}=K_0 + K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)+K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi^{*}=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

S.No	(Pa-s) of Iron	Kinematic Viscocity(m^2/s) of Iron(m^2/sec)	Crystalllographic Directions<uvw>
1.	3.2	0.46	<100>
2.	3.0	0.43	<110>
3.	1.0	0.4	<111>

Kinenamic Viscosity Of Iron(m^2/sec)	0.46	0.43	0.4
Dynanamic Viscosity Of Iron(Pa-s)	3.2	3.0	1.0

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$\xi^*_{DVFe}=1.32-0.084(\sum\alpha_1\alpha_2)+1.32(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+1.98(\sum\alpha_1^3)-11.14(\sum\alpha_1^2\alpha_2\alpha_3)-0.66(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.66(\sum\alpha_1^6)$

$\xi^*_{KVFe}=0.36-0.73(\sum\alpha_1\alpha_2)+0.36(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.54(\sum\alpha_1^3)-1.7245(\sum\alpha_1^2\alpha_2\alpha_3)-0.18(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.18(\sum\alpha_1^6)$

4.4 Calculation Of Dynamic Viscosity and Kinematic viscosity of Chromium By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

$\xi_{DV}^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)++K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi_{KV}^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)+K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi^*=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

S.No	Dynamic Viscosity (Pa-s) of Chromium	Kinematic Viscocity(m^2/s) of Chromium(m^2/sec)	Crystalllographic Directions<uvw>
1.	2.4	0.33	<100>
2.	2.2	0.31	<110>
3.	2.0	0.28	<111>

Dynamic Viscosity Of Chromium(μPa·s)	2.4	2.2	2.0
Kinenamic Viscosity Of Chromium(m^2/sec)	0.33	0.31	0.28

$\xi^*_{DVCr}=0.96-1.7572(\sum\alpha_1\alpha_2)+0..96(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+1.44(\sum\alpha_1^3)+0.479(\sum\alpha_1^2\alpha_2\alpha_3)-0.48(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.48(\sum\alpha_1^6)$

$\xi^*_{KVCr}=0.132-1.0874(\sum\alpha_1\alpha_2)+0.132(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.198(\sum\alpha_1^3)-1.7815(\sum\alpha_1^2\alpha_2\alpha_3)-0.066(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0..066(\sum\alpha_1^6)$

4.5 **Calculation Of Dynamic Viscosity and Kinematic viscosity of Molybenum By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes**

$\xi_{DV}^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)++K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi_{KV}^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)+K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi^*=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

S.No	Dynamic Viscosity (Pa-s) of Molybenum	Kinematic Viscocity(m^2/s) of Molybenum(m^2/sec)	Crystalllographic Directions<uvw>
1.	3.2	0.31	<100>
2.	3.0	0.29	<110>
3.	2.8	0.27	<111>

Dynamic Viscosity Of Molybenum(μPa·s)	3.2	3.0	2.8
Kinenamic Viscosity Of Molybenum(m^2/sec)	0.31	0.29	0.27

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ξ^*_{DVMo}=1.28-0.2696($\sum\alpha_1\alpha_2$)+1.28($\sum\alpha_1^2$)+2($\prod\alpha_1$)+2($\sum\alpha_1^2\alpha_2^2$)+1.92($\sum\alpha_1^3$)-4.073($\sum\alpha_1^2\alpha_2\alpha_3$)-0.64($\sum\alpha_1^4$)+1($\sum\alpha_1^4\alpha_2^2$)-0.64($\sum\alpha_1^6$)
ξ^*_{KVMo}=1.24-1.3332($\sum\alpha_1\alpha_2$)+1.24($\sum\alpha_1^2$)+2($\prod\alpha_1$)+2($\sum\alpha_1^2\alpha_2^2$)+0.186($\sum\alpha_1^3$)-0.394($\sum\alpha_1^2\alpha_2\alpha_3$)-0.0.62($\sum\alpha_1^4$)+1($\sum\alpha_1^4\alpha_2^2$)-0..062($\sum\alpha_1^6$)

4.6 Calculation Of Dynamic Viscosity and Kinematic viscosity of Titanium By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

$\xi_{DV}^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)++K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi_{KV}^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)+K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi^*=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

S.No	Dynamic Viscosity (Pa-s) of Titanium	Kinematic Viscocity(m^2/s) of Titanium(m^2/sec)	Crystalllographic Directions<uvw>
1.	1.9	0.42	<100>
2.	1.7	0.38	<110>
3.	1.3	0.33	<111>

Dynamic Viscosity Of Titanium(μPa·s)	1.9	1.7	1.3
Kinenamic Viscosity Of Titanium(m^2/sec)	0.42	0.38	0.33

ξ^*_{DVTi}=0.36-0.73($\sum\alpha_1\alpha_2$)+0.36($\sum\alpha_1^2$)+2($\prod\alpha_1$)+2($\sum\alpha_1^2\alpha_2^2$)+0.54($\sum\alpha_1^3$)-1.7245($\sum\alpha_1^2\alpha_2\alpha_3$)-0.38($\sum\alpha_1^4$)+1($\sum\alpha_1^4\alpha_2^2$)-0.38($\sum\alpha_1^6$)
ξ^*_{KVTi}=0.168-1.25($\sum\alpha_1\alpha_2$)+0.168($\sum\alpha_1^2$)+2($\prod\alpha_1$)+2($\sum\alpha_1^2\alpha_2^2$)+0.252($\sum\alpha_1^3$)+20.3($\sum\alpha_1^2\alpha_2\alpha_3$)-0.084($\sum\alpha_1^4$)+1($\sum\alpha_1^4\alpha_2^2$)-0.084($\sum\alpha_1^6$)

4.7 Calculation Of Dynamic Viscosity and Kinematic viscosity of Magnesium By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

$\xi_{DV}^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)++K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi_{KV}^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)+K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi^*=K+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

S.No	Dynamic Viscosity (Pa-s) of Magnesium	Kinematic Viscocity(m^2/s) of Magnesium(m^2/sec)	Crystalllographic Directions<uvw>
1.	0.025	0.017	<100>
2.	0.027	0.018	<110>
3.	0.026	0.019	<111>

Dynamic Viscosity Of Magnesium(μPa·s)	0.025	0.027	0.026
Kinenamic Viscosity Of Magnesium(m^2/sec)	0.017	0.018	0.019

$\xi^*_{DVMg}=0.36-0.73(\sum\alpha_1\alpha_2)+0.36(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.54(\sum\alpha_1^3)-1.7245(\sum\alpha_1^2\alpha_2\alpha_3)-0.18(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.18(\sum\alpha_1^6)$

$\xi^*_{KVMg}=0.36-0.73(\sum\alpha_1\alpha_2)+0.36(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.54(\sum\alpha_1^3)-1.7245(\sum\alpha_1^2\alpha_2\alpha_3)-0.18(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.18(\sum\alpha_1^6)$

4.8 Calculation Of Dynamic Viscosity and Kinematic viscosity of Zinc By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

$\xi_{DV}^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)++K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi_{KV}^*=K_0+K_1(\alpha_1\alpha_2+\alpha_2\alpha_3+\alpha_3\alpha_1)+K_2(\alpha_1^2+\alpha_2^2+\alpha_3^2)+K_3(\alpha_1\alpha_2\alpha_3)+K_4(\alpha_1^2\alpha_2^2+\alpha_2^2\alpha_3^2+\alpha_3^2\alpha_1^2)+K_5(\alpha_1^3+\alpha_2^3+\alpha_3^3)+K_6(\alpha_1^2\alpha_2\alpha_3+\alpha_2^2\alpha_3\alpha_1+\alpha_3^2\alpha_1\alpha_2)+K_7(\alpha_1^4+\alpha_2^4+\alpha_3^4)+K_8(\alpha_1^4\alpha_2^2+\alpha_2^4\alpha_3^2+\alpha_3^4\alpha_1^2)+K_9(\alpha_1^6+\alpha_2^6+\alpha_3^6)$

$\xi^*=K_+K_1(\sum\alpha_1\alpha_2)+K_2(\sum\alpha_1^2)+K_3(\prod\alpha_1)+K_4(\sum\alpha_1^2\alpha_2^2)++K_5(\sum\alpha_1^3)+K_6(\sum\alpha_1^2\alpha_2\alpha_3)+K_7(\sum\alpha_1^4)+K_8(\sum\alpha_1^4\alpha_2^2)+K_9(\sum\alpha_1^6)$

S.No	Dynamic Viscosity (Pa-s) of Zinc	Kinematic Viscocity(m^2/s) of Zinc(m^2/sec)	Crystalllographic Directions<uvw>
1.	1.6	0.24	<100>
2.	1.5	0.23	<110>
3.	1.4	0.21	<111>

Dynamic Viscosity Of Zinc(μPa·s)	1.6	1.5	1.4
Kinenamic Viscosity Of Zinc(m^2/sec)	0.24	0.23	0.21

$\xi^*_{DVZn}=0.64-1.3576(\sum\alpha_1\alpha_2)+0.64(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.96(\sum\alpha_1^3)-+7.06(\sum\alpha_1^2\alpha_2\alpha_3)-0.32(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.32(\sum\alpha_1^6)$

$\xi^*_{KVZn}=0.096-0.1.0554(\sum\alpha_1\alpha_2)+0.096(\sum\alpha_1^2)+2(\prod\alpha_1)+2(\sum\alpha_1^2\alpha_2^2)+0.144(\sum\alpha_1^3)-+3.73(\sum\alpha_1^2\alpha_2\alpha_3)-0.048(\sum\alpha_1^4)+1(\sum\alpha_1^4\alpha_2^2)-0.048(\sum\alpha_1^6)$

V. Generised Estimation of Coherence length And Texture Factor of FeSe of Iron Based Super Conductor By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

Super Conducting Material	Coherence Length (ξ) - 100	Coherence Length (ξ) - 110	Coherence Length (ξ) - 111
FeSe	**1.0 nm**	**1.2 nm**	**1.5 nm**
FeAs (F-doped SmFeAsO)	1.5 nm	2.0 nm	2.5 nm
BaFe2As2	2.0 nm	2.5 nm	3.0 nm
SmFeAsO	3.5 nm	4.0 nm	4.5 nm

Taking **FeSe** Iron Based Super Conductor,Similar procesures can be extended for other Iron Based Super Conductor FeAs (F-doped SmFeAsO), ,$BaFe_2As_2$,SmFeAsO

$\xi^* = K_0 + K_1(\sum\alpha^2_1\,\alpha^2_2) + K_2(\prod\alpha^2_1)) + K_3(\sum\alpha^2_1\,\alpha^2_2)^2 + K_4(\sum\alpha^2_1\,\alpha^2_2)(\prod\alpha^2_1) + K_5(\sum\alpha^2_1\,\alpha^2_2)^3 + K_6(\prod\alpha^2_1)^2$

For <100> directions, $\alpha_1=1, \alpha_2=0, \alpha_3=0$ ….[I]

For <110> directions, $\alpha_1=1/\sqrt{2}, \alpha_2=1/\sqrt{2}, \alpha_3=0$….[II]

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For <111> directions, $\alpha_1 = 1/\sqrt{3}$, $\alpha 2 = 1/\sqrt{3}$, $\alpha_3 = 1/\sqrt{3}$….[III]

5.1 Calculation Of Coherence Length(ξ), of Iron Based Superconductor FeSe

S.No	Crystallographic Directions	Coherence Length ξ
1.	<100>	1.0 nm
2.	<110>	1.2 nm
3.	<111>	1.5 nm

For <100> directions, $\alpha_1 = 1$, $\alpha 2 = 1$, $\alpha_3 = 0$ ….[I], in Standard Equation

$\xi^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1)) + K_3 (\sum\alpha^2_1 \alpha^2_2)^2 + K_4 (\sum\alpha^2_1 \alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1 \alpha^2_2)^3 + K_6 (\prod\alpha^2_1)^2$

We have

$\xi^*_{[100]} = K_0 = 1.0$;

For <110> directions, $\alpha_1 = 1/\sqrt{2}$, $\alpha 2 = 1/\sqrt{2}$, $\alpha_3 = 0$

Using [II] , in Standard Equation

$1.2 = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1) + K_3 (\sum\alpha^2_1 \alpha^2_2)^2 + K_4 (\sum\alpha^2_1 \alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1 \alpha^2_2)^3 + K_6 (\prod\alpha^2_1)^2$

- $1.2 = 1.0 + K_1/4 + K_3/16 + K_5/64$
- $[16K_1 + 4K_3 + K_5] = 12.8$……[IV];

For <111> directions, $\alpha_1 = 1/\sqrt{3}$, $\alpha 2 = 1/\sqrt{3}$, $\alpha_3 = 1/\sqrt{3}$….[III];

Using [III] , in Standard Equation

$\xi^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1) + K_3 (\sum\alpha^2_1 \alpha^2_2)^2 + K_4 (\sum\alpha^2_1 \alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1 \alpha^2_2)^3 + K_6 (\prod\alpha^2_1)^2$

$1.5 = 1.0 + K_1/3 + K_2/27 + K_3/9 + K_4/81 + K_5/27 + K_6/729 = 125 + K_1/3 + K_5/27 + K_3/9 + K_4/81 + K_2/27 + K_6/729$ [re-arraging K_2, K_5

- $27[9K_1 + 3K_3 + K_5] + [9K_4 + 3K_2 + K_6] = 0.5 * 729 = 364.5$
- $27 * 13 + 13.5 = 364.5$
- $[9K_1 + 3K_3 + K_5] = 13$….[V];
- $[9K_4 + 3K_2 + K_6] = 13.5$
- $9*1 + 3*1 + 1.5 = 13.5$
- $K_4 = 1$; $K_2 = 1$; $K_6 = 1.5$
- From[IV] - [V];We have
- $16K_1 + 4K_3 + K_5 = 12.8$

(-)

$9K_1 + 3K_3 + K_5 = 13.5$

$7K_1 + K_3 = -0.7$

- $7 * -0.2 + 0.7 = -0.7$;
- $K_1 = -0.2$; $K_3 = 0.7$;
- $K_5 = 13.5 + 9*0.2 - 3*0.7$
- $K_5 = 13.2$

Substituting , K_0, K_1, K_2 K_3, K_4, K_5, K_6 ,in standard equation, we have $Y^* = K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1) + K_3 (\sum\alpha^2_1 \alpha^2_2)^2 + K_4 (\sum\alpha^2_1 \alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1 \alpha^2_2)^3 + K_6 (\prod\alpha^2_1)^2$

$K_0 = 1.0$, $K_1 = -0.2$, $K_2 = 1$; $K3 = 0.7$; $K_4 = 1$; $K_5 = 13.2$; $K_6 = 1.5$

$\xi^*_{FeSe} = 1.0 - 0.2(\sum\alpha^2_1 \alpha^2_2) + 1 (\prod\alpha^2_1) + 0.7(\sum\alpha^2_1 \alpha^2_2)^2 + 1 (\sum\alpha^2_1 \alpha^2_2)(\prod\alpha^2_1) + 13.2(\sum\alpha^2_1 \alpha^2_2)^3 + 1.5(\prod\alpha^2_1)^2$ …….[VI

- **FOR <100> Directions, $\xi^*_{FeSe} = 1.0$**
- **FOR <110> Directions, $\xi^*_{FeSe} = 1.0 - 0.2/4 + 0.7/16 + 13.2/64 = 1.2$**
- **FOR <111> Directions, $\xi^*_{FeSe} = 1.0 - 0.2/3 + 1/27 + 0.7/9 + 1/81 + 13.2/27 + 1.5/729 = 1.5$**

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5.2 Calculation Texture Factor, of Iron Based Superconductor FeSe Of An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

S.No.	Coherence Length,ξ	Texture Factor, A
1.0	1.0 = 10+2.5*A	-3.6
2.0	1.2= 10+2.0*A	-4.4
3.0	1.5= 10+3.0*A	-2.833

$A^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1))+ K_3 (\sum\alpha^2_1\ \alpha^2_2)^2 + K_4 (\sum\alpha^2_1\ \alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1\ \alpha^2_2)^3+ K_6 (\prod\alpha^2_1)^2$

S.No	Crystallographic Directions	Coherence Length, ξ	Texture Factor(*465.586093523)	Magnetic Anisotropy Energy Density of iron E*=0.355A*-1.898
1.	<100>	1.0 nm	-3.6	-3.176
2.	<110>	1.2 nm	-4.4	-3.46
3.	<111>	1.5 nm	-2.833	-2.903715

-

DISCUSSION:

The <110>//ND fibre accounts for the lowest anisotropy energy since the flux lines, distributed homogenously in a plane of the rotating laminated sheet, have an easiest magnetization direction with the in-plane rotated cube texture components. On the contrary, the <100>//ND,<111>//RD fibre orientations have relatively high anisotropy energy and as such, the occurrence of these components in iron based super conductor is undesirable.

$A^*_{[100]} = K_0 = -3.6$;

For <110> directions, $\alpha_1 = 1/\sqrt{2}$, $\alpha 2 = 1/\sqrt{2}$, $\alpha_3 = 0$

Using [II] , in Standard Equation

$-4.4 = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1) + K_3 (\sum\alpha^2_1\ \alpha^2_2)^2 + K_4 (\sum\alpha^2_1\ \alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1\ \alpha^2_2)^3+ K_6 (\prod\alpha^2_1)^2$

- $-4.4 = -3.6 + K_1/4 + K_3/16 + K_5/64$
- $[16K_1 + 4K_3 + K_5] = -0.8*64 = -51.2$……[IV];

For <111> directions, $\alpha_1 = 1/\sqrt{3}$, $\alpha 2 = 1/\sqrt{3}$, $\alpha_3 = 1/\sqrt{3}$….[III];

Using [III] , in Standard Equation

$A^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1) + K_3 (\sum\alpha^2_1\ \alpha^2_2)^2 + K_4 (\sum\alpha^2_1\ \alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1\ \alpha^2_2)^3+ K_6 (\prod\alpha^2_1)^2$

$-2.833 = -3.6 + K_1/3 + K_2/27 + K_3/9 + K_4/81 + K_5/27 + K_6/729 = 125 + K_1/3 + K_5/27 + K_3/9 + K_4/81 + K_2/27 + K_6/729$ [re-arraging K_2, K_5

- $27[9K_1 + 3K_3 + K_5] + [9K_4 + 3K_2 + K_6] = 0.767* 729 = 559.143$
- $27 *20+19.143 = 559.143$
- $[9K_1 + 3K_3 + K_5] = 20$….[V];
- $[9K_4 + 3K_2 + K_6] = 19.143$
- $9*2+3*0.334+0.143 = 19.143$
- $K_4 = 2$; $K_2 = 0.334$; $K_6 = 0.143$
- From[IV] - [V];We have
- $16K_1 + 4K_3 + K_5 = -51.2$

(-)

$9K_1 + 3K_3 + K_5 = 20$

$7K_1 + K_3 = -71.2$

- $7* (-10) -1.2 = -71.2$
- $K_1 = -10$; $K_3 = -1.2$

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- K_5 =20+3*1.2+9*10
- K_5 =103.2

Substituting , K_0, K_1, K_2 K_3, K_4, K_5, K_6 ,in standard equation, we have

$A^* = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1) + K_3 (\sum\alpha^2_1\ \alpha^2_2)^2 + K_4 (\sum\alpha^2_1\ \alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1\ \alpha^2_2)^3 + K_6 (\prod\alpha^2_1)^2$

K_0=-3.6, K_1= 0.334, K_2=1; K3= -1.2; K_4=2; K_5=103.2; K_6 =0.143

$A^* = 3.6 + 0.334(\sum\alpha^2_1\ \alpha^2_2) + 1 (\prod\alpha^2_1) -1.2 (\sum\alpha^2_1\ \alpha^2_2)^2 + 4(\sum\alpha^2_1\ \alpha^2_2)(\prod\alpha^2_1) + 103.2 (\sum\alpha^2_1\ \alpha^2_2)^3 + 0.143 (\prod\alpha^2_1)^2$

Similar procesures can be extended for other Iron Based Super Conductor FeAs (F-doped SmFeAsO), ,$BaFe_2As_2$,SmFeAsO

Super Conducting Material	Coherence Length (ξ) - 100	Coherence Length (ξ) - 110	Coherence Length (ξ) -111
FeAs (F-doped SmFeAsO)	1.5 nm	2.0 nm	2.5 nm
BaFe2As2	2.0 nm	2.5 nm	3.0 nm
SmFeAsO	3.5 nm	4.0 nm	4.5 nm

| For Iron Based Superconductor
ξ_{100},ξ_{110},ξ_{111} are coherence lengths in (nm),T_{100},T_{110},T_{111} Texture Factors along {100},{110},{111} directions
| ξ_{100} = A + B T_{100} (nm)
| ξ_{110} = A + B T_{110} (nm)
| ξ_{111} = A + B T_{111} (nm) |
**FeAs (F-doped SmFeAsO)*	25 + 1.2 T_{100}	25 + 1.0 T_{110	25 + 0.8 T_{111}
BaFe_2As_2	40 + 1.3 T_{100	40 + 1.1 T_{110}	40 + 0.9 T_{111}
SmFeAsO	35 + 1.4 T_{100}	35 + 1.1 T_{110}	35 + 0.9 T_{111}

VI CONCLUSION.

Critical Resolved Shear Stress,Young's Modulus,Shear Modulus,Thermal Conductivity,Vicker's Hardness,Speed of Sound,Mean Free Time,Fracture Toughness,UV and Visible Optical Adsorption,Suface,Cleavege Energy,Change in Resistivity of Diamond & Goss and Cube Texture Quantification of YBCO,Ni Based,MgB_2,NbTi,BSCCO,FeSe,LaFeAsO Superconductors,Dynamic and Kinematic Viscosity of Copper and Alumium,Iron,Chromium,Molybenum,Titanium,Magnesium,Zinc,Coherence length and Texture Factor of FeSe Iron Based Super Conductor can be expressed By an Expansion into Direction Cosines α_1, α2, α3 With Respect To the Crystal Axes. Generalized equation of Critical Resolved Shear Stress,Young's Modulus,Shear Modulus,Thermal Conductivity,Vicker's Hardness,Speed of Sound,Mean Free Time,Fracture Toughness,UV and Visible Optical Adsorption,Suface,Cleavege EnergyChange in Resistivity of Diamond & Goss and Cube Texture Quantification of YBCO,Ni Based,MgB_2,NbTi,BSCCO,FeSe,LaFeAsO Superconductors,Dynamic and Kinematic Viscosity of Copper and Alumium,Iron,Chromium,Molybenum,Titanium,Magnesium,Zinc,Coherence length and Texture Factor of FeSe Iron Based Super Conductor can be utilized to obtain its value at any crystallographic direction with the provision of directional cosines α_1, α2, α3 along that particular crystallographic direction.

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