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GENERALISED ESTIMATION OF LONGITUDINAL AND TRANSVERSE MODE VELOCITY AND MINIMUM THERMAL CONDUCTIVITY OF LAFEO3 BY AN EXPANSION INTO DIRECTION COSINES $\alpha_1,\alpha_2,\alpha_3$ WITH RESPECT TO THE CRYSTAL AXES

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ABSTRACT
In this present article, Longitudinal,Transverse Mode Velocoity and Minimum Thermal Conductivity LaFeo3 of is expressed by an expansion into Direction Cosines α_1, α2, α3 with respect to the crystal axes. The General Equation Longitudinal,Transverse Mode Velocoity and Minimum Thermal Conductivity LaFeo3 can be used to determine their values at <100>, <110>, <111> directions respectively. In the present article Longitudinal,Transverse Mode Velocoity and Minimum Thermal Conductivity LaFeo3 is determined at <100>, <110>, <111> directions respectively. The Equation can be generalized to include any element or compound with anisotropic property.

Keywords:
Anisotropic, Longitudinal, Transverse Mode Velocity, Minimum Thermal Conductivity, Direction Cosines

I. INTRODUCTION
Aisotropic Properties are those properties which vary with crystal direction Longitudinal,Transverse Mode Velocoity and Minimum Thermal Conductivity LaFeo3 is different at <100>,<110>,<111> directions viz. 2.345,2.693,2.8 Km/sec and and 1.548,1.133,1.107 Km/secand 0.585, 0.533 0.539 $WK^{-1}m^{-1}$respectively. Longitudinal,Transverse Mode Velocoity and Minimum Thermal Conductivity LaFeo3 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:
$$G^* = K_0 + K_1 (\sum\alpha^2_1\,\alpha^2_2) + K_2 (\prod\alpha^2_1) + K_3 (\sum\alpha^2_1\,\alpha^2_2)^2 + K_4 (\sum\alpha^2_1\,\alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1\,\alpha^2_2)^3 + K_6 (\prod\alpha^2_1)^2$$

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

[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	Longitudinal Mode Velocity Lafeo3(Km/Sec)	Transverse Mode Velocity Lafeo3 (Km/sec)	Minimum Thermal Conductivity $WK^{-1}m^{-1}$
1.	2.345	1.548	0.585
2.	2.693	1.133	0.533

3.	2.800	1.107	0.539

II. Calculation Of Longitudinal ModeVelocity Of LaFeO3 By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

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

For <100> directions, $\alpha_1 =1, \alpha2 =0, \alpha_3=0$ ….[I]
For <110> directions, $\alpha_1 =1/\sqrt{2}, \alpha2 =1/\sqrt{2}, \alpha_3=0$….[II]
For <111> directions, $\alpha_1 =1/\sqrt{3}, \alpha2 =1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III]

2.1 Calculation Of Longitudinal ModeVelocity Of LaFeO3 By An Expansion Into Direction Cosines $\alpha_1,\alpha_2,\alpha_3$ With Respect To The Crystal Axes

From Ref [5] , We have

For <100> directions, $\alpha_1 =1, \alpha2 =1, \alpha_3=0$ ….[I], in Standard Equation

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

We have

$VL^*_{[100]} = K_0 = 2.345;$

For <110> directions, $\alpha_1 =1/\sqrt{2}, \alpha2 =1/\sqrt{2}, \alpha_3=0$

Using [II] , in Standard Equation

$2.693= K_0 + K_1 (\sum\alpha^2_1 \alpha^2_2) + K_2 (\prod\alpha^2_1) + K_3 (\sum\alpha^2_1 \alpha^2_2)^2 + K_4 (\sum\alpha^2_1 \alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1 \alpha^2_2)^3 + K_6 (\prod\alpha^2_1)^2$

⇨ $2.693 = 2.345 + K_1/4 + K_3/16 + K_5/64$

⇨ $[16K_1+ 4K_3 + K_5] = 22.272$ ……..[IV];

For <111> directions, $\alpha_1 =1/\sqrt{3}, \alpha2 =1/\sqrt{3}, \alpha_3=1/\sqrt{3}$….[III];

Using [III] , in Standard Equation

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

$2.8 = 2.345 + K_1/3 + K_2/27+ K_3/9+ K_4/81+ K_5 /27+ K_6 /729 =2.345 + K_1/3 + K_5/27+ K_3/9+ K_4/81+ K_2 /27+ K_6 /729$ [re-arraging K_2, K_5

⇨ $27[9K_1+ 3K_3 + K_5] +[9K_4+ 27K_2 + K_6]= 0.455* 729 =331.695$

⇨ $27 * 12+7.695 = 331.695$

⇨ $[9K_1+ 3K_3 + K_5] =12$….[V];

⇨ $[9K_4+ 272K_2 + K_6]= 7.695$

⇨ $-3*9+27*1+7.695= 7.695$

⇨ $K_4 = -3; K_2=1; K_6=7.695$

⇨ **From[IV] - [V];We have**

⇨ $16K_1+ 4K_3 + K_5= 22.272$

(-)

$9K_1+ 3K_3 + K_5 =12$

$7K_1+ K_3 = 10.272$

⇨ $7*1+ 3.272 = 10.272;$

⇨ $K_1= 1;K_3 = 3.272;$

⇨ $K_5 =12 – 3*3.272 –9*1$

⇨ $K_5 = -6.816$

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=2.345, K_1=1, K_2= 1; K3=3.272; K_4= -3; K_5= -6.816 ; K_6 =7.695

$VL^*_{LAFEO3} = 2.345 +1 (\sum\alpha^2_1\ \alpha^2_2) +1 (\prod\alpha^2_1) +3.272(\sum\alpha^2_1\ \alpha^2_2)^2 -3(\sum\alpha^2_1\ \alpha^2_2)(\prod\alpha^2_1) -6.816(\sum\alpha^2_1\ \alpha^2_2)^3 + 7.695(\prod\alpha^2_1)^2$ ……….[VI];

⇨ [VI] Above Is Generalised Estimation Of Longidutinal Mode Velocity Of LaFeO3 By An Expansion Into Direction Cosines A_1,A_2,A_3 With Respect To The Crystal Axes

⇨ FOR <100> Directions, VL* = 2.345

⇨ FOR <110> Directions, VL*\ = 2.345+ 1/4 + 3.272/16 -6.816/64 = 210.5

⇨ FOR <111> Directions, VL*=2.345+ 1/3 + 1/27 + 3.272/9 - 3/81 -6.816/27 + 7.695/729 = 272.7

⇨ ABOVE VALUES,CONFORM TO THE STANDARD YOUNG'S MODULUS OF LAFEO3.

⇨

III. Calculation Of Transverse ModeVelocity Of LaFeO3 By An Expansion Into Direction Cosines α_1,α_2,α_3 With Respect To The Crystal Axes

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

For <100> directions, α_1 =1, α2 =0, α_3=0 ….[I]
For <110> directions, α_1 =1/√2, α2 =1/√2, α_3=0….[II]
For <111> directions, α_1 =1/√3, α2 =1/√3, α_3=1/√3….[III]

2.1 Calculation Of Transverse ModeVelocity Of LaFeO3 By An Expansion Into Direction Cosines α_1,α_2,α_3 With Respect To The Crystal Axes

From Ref [5] , We have

For <100> directions, α_1 =1, α2 =1, α_3=0 ….[I], in Standard Equation

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

We have

$VT^*_{[100]} = K_0$ = 1.548;

For <110> directions, α_1 =1/√2, α2 =1/√2, α_3=0
Using [II] , in Standard Equation

$1.133 = K_0 + K_1 (\sum\alpha^2_1\ \alpha^2_2) + K_2 (\prod\alpha^2_1) + K_3 (\sum\alpha^2_1\ \alpha^2_2)^2 + K_4 (\sum\alpha^2_1\ \alpha^2_2)(\prod\alpha^2_1) + K_5 (\sum\alpha^2_1\ \alpha^2_2)^3 + K_6 (\prod\alpha^2_1)^2$

⇨ $1.133 = 1.548 + K_1/4 + K_3/16 + K_5/64$

⇨ $[16K_1 + 4K_3 + K_5] = -0.415*64 = -26.56$……..[IV];

For <111> directions, α_1 =1/√3, α2 =1/√3, α_3=1/√3….[III];
Using [III] , in Standard Equation

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

$1.107 = 1.548 + K_1/3 + K_2/27 + K_3/9 + K_4/81 + K_5/27 + K_6/729 = 2.345 + K_1/3 + K_5/27 + K_3/9 + K_4/81 + K_2/27 + K_6/729$ [re-arraging K_2, K_5

⇨ $27[9K_1 + 3K_3 + K_5] + [9K_4 + 27K_2 + K_6] = 0.455* 729 = -321.489$

⇨ 27 * -11 -24.489 = -321.489

⇨ **[9K_1+ 3K_3 + K_5] =- -11….[V];**
⇨ **[9K_4+ 27K_2 + K_6]= -24.489**
⇨ **-5*9+27*1 -6.489= -24.489**
⇨ **K_4 = -5; K_2=1; K_6= -6.489**

⇨ **From[IV] - [V];We have**

⇨ **16K_1+ 4K_3 + K_5= -26.56**

(-)

9K_1+ 3K_3 + K_5 = -11

7K_1+ K_3 = -15.56
⇨ **7* -2 – 1.56 = -15.56;**
⇨ **K_1= -2;K_3 = -1.56;**
⇨ **K_5 = -11+ 3*1.56+9*2**
⇨ **K_5 = 11.68**

Substituting , K_0, K_1, K_2 K_3, K_4, K_5, K_6 ,in standard equation, we have **$VT^* = K_0 + K_1 (\sum\alpha^2{}_1\ \alpha^2{}_2) + K_2 (\prod\alpha^2{}_1) + K_3 (\sum\alpha^2{}_1\ \alpha^2{}_2)^2 + K_4 (\sum\alpha^2{}_1\ \alpha^2{}_2)(\prod\alpha^2{}_1) + K_5 (\sum\alpha^2{}_1\ \alpha^2{}_2)^3 + K_6 (\prod\alpha^2{}_1)^2$**
K_0=1.548, K_1= -2, K_2= 1; K3= -1.56; K_4= -5; K_5= 11.68 ; K_6 = -6.489

$VT^*_{LAFEO3} = 1.548 -2(\sum\alpha^2{}_1\ \alpha^2{}_2) +1 (\prod\alpha^2{}_1) -1.56(\sum\alpha^2{}_1\ \alpha^2{}_2)^2 -5(\sum\alpha^2{}_1\ \alpha^2{}_2)(\prod\alpha^2{}_1) +11.68(\sum\alpha^2{}_1\ \alpha^2{}_2)^3 - 6.489(\prod\alpha^2{}_1)^2$ ……….[VI];

⇨ **[VI] Above Is Generalised Estimation Of Transverse Mode Velocity Of LaFeO3 By An Expansion Into Direction Cosines A_1,A_2,A_3 With Respect To The Crystal Axes**

⇨ **FOR <100> Directions, VT* = 1.548**

⇨ **FOR <110> Directions, VT*\ = 1.548 -2/4 -1.56/16 +11.68/64 = 1.133**

⇨ **FOR <111> Directions, VT*=1.548 -2/3 + 1/27 -1.56/9 - 5/81 +11.68/27 -6.489/729 = 1.107**

II Calculation Of Minimum Thermal Conductivity Of LaFeO3 By An Expansion Into Direction Cosines α_1,α_2,α_3 With Respect To The Crystal Axes
$MTC^* = K_0 + K_1 (\sum\alpha^2{}_1\ \alpha^2{}_2) + K_2 (\prod\alpha^2{}_1)) + K_3 (\sum\alpha^2{}_1\ \alpha^2{}_2)^2 + K_4 (\sum\alpha^2{}_1\ \alpha^2{}_2)(\prod\alpha^2{}_1) + K_5 (\sum\alpha^2{}_1\ \alpha^2{}_2)^3 + K_6 (\prod\alpha^2{}_1)^2$
For <100> directions, α_1 =1, α2 =0, α_3=0 ….[I]
For <110> directions, α_1 =1/√2, α2 =1/√2, α_3=0….[II]
For <111> directions, α_1 =1/√3, α2 =1/√3, α_3=1/√3….[III]
2.1 Calculation Of Minimum Thermal Condutivity Of LaFeO3 By An Expansion Into Direction Cosines α_1,α_2,α_3 With Respect To The Crystal Axes
From Ref [5] , We have
For <100> directions, α_1 =1, α2 =1, α_3=0 ….[I], in Standard Equation
$MTC^* = K_0 + K_1 (\sum\alpha^2{}_1\ \alpha^2{}_2) + K_2 (\prod\alpha^2{}_1)) + K_3 (\sum\alpha^2{}_1\ \alpha^2{}_2)^2 + K_4 (\sum\alpha^2{}_1\ \alpha^2{}_2)(\prod\alpha^2{}_1) + K_5 (\sum\alpha^2{}_1\ \alpha^2{}_2)^3 + K_6 (\prod\alpha^2{}_1)^2$
We have
$MTC^*_{[100]} = K_0 = 0.585$;

For <110> directions, $\alpha_1 = 1/\sqrt{2}$, $\alpha 2 = 1/\sqrt{2}$, $\alpha_3 = 0$
Using [II] , in Standard Equation

$0.533 = K_0 + K_1 (\sum \alpha^2_1 \alpha^2_2) + K_2 (\prod \alpha^2_1) + K_3 (\sum \alpha^2_1 \alpha^2_2)^2 + K_4 (\sum \alpha^2_1 \alpha^2_2)(\prod \alpha^2_1) + K_5 (\sum \alpha^2_1 \alpha^2_2)^3 + K_6 (\prod \alpha^2_1)^2$

⇨ **$0.533 = 0.585 + K_1/4 + K_3/16 + K_5/64$**

⇨ **$[16K_1 + 4K_3 + K_5] = -3.328$ ……..[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

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

$0.539 = 0.585 + K_1/3 + K_2/27 + K_3/9 + K_4/81 + K_5/27 + K_6/729 = 2.345 + K_1/3 + K_5/27 + K_3/9 + K_4/81 + K_2/27 + K_6/729$ [re-arraging K_2, K_5

⇨ **$27[9K_1 + 3K_3 + K_5] + [9K_4 + 27K_2 + K_6] = 0.455 * 729 = -33.534$**

⇨ **$27 * -1 - 6.534 = -33.534$**

⇨ **$[9K_1 + 3K_3 + K_5] = -1$….[V];**

⇨ **$[9K_4 + 27K_2 + K_6] = -6.534$**

⇨ **$-3*9 + 27*1 - 6.534 = -6.534$**

⇨ **$K_4 = -3$; $K_2 = 1$; $K_6 = -6.534$**

⇨ **From[IV] - [V];We have**

⇨ **$16K_1 + 4K_3 + K_5 = -3.328$**

(-)

$9K_1 + 3K_3 + K_5 = -1$

$7K_1 + K_3 = -2.328$

⇨ **$7*1 - 9.328 = -2.328$;**

⇨ **$K_1 = 1$; $K_3 = -9.328$;**

⇨ **$K_5 = -1 + 3*9.328 - 9*1$**

⇨ **$K_5 = 17.984$**

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

$K_0 = 0.585$, $K_1 = 1$, $K_2 = 1$; $K3 = -9.328$; $K_4 = -3$; $K_5 = 17.984$; $K_6 = -6.534$

$MTC^* = 0.585 + 1 (\sum \alpha^2_1 \alpha^2_2) + 1 (\prod \alpha^2_1) - 9.328(\sum \alpha^2_1 \alpha^2_2)^2 - 3(\sum \alpha^2_1 \alpha^2_2)(\prod \alpha^2_1) + 17.984(\sum \alpha^2_1 \alpha^2_2)^3 - 6.534(\prod \alpha^2_1)^2$ ……….[VI];

⇨ **[VI] ABOVE IS GENERALISED ESTIMATION OF MINIMUM THERMAL CONDUCTIVITY OF LAFEO3 BY AN EXPANSION INTO DIRECTION COSINES $\alpha_1, \alpha_2, \alpha_3$ WITH RESPECT TO THE CRYSTAL AXES**

⇨ **FOR <100> Directions, $MTC^* = 0.585$**

⇨ **FOR <110> Directions, $MTC^*\backslash = 0.585 + 1/4 - 9.328/16 + 17.984/64 = 0.533$**

⇨ **FOR <111> Directions,$MTC^* = 0.585 + 1/3 + 1/27 - 9.328/9 - 3/81 + 17.984/27 - 6.534/729 = 0.539$**

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:

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

[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] => $V^*_{100} = \mathbf{K_0}$

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

$\Rightarrow \mathbf{K_1=4[V^*_{110} - V^*_{100}]}$

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

⇨ $V^*_{111} = \mathbf{K_0 + K1/3 + K2/27} = V^*_{100} + \mathbf{4[V^*_{110} - V^*_{100}]/3 + K_2/27}$

⇨ $\mathbf{K_2 = [V^*_{111} - V^*_{100}] *27 - 36[V^*_{110} - V^*_{100}] = [27V^*_{111} - 36V^*_{110} + 9\ V^*_{100}]}$

Substituting back in Original Equation, we have

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

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

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

III CONCLUSION.

Longitudinal Mode, Transverse Mode Velocity, Minimum Thermal Conductivity Of LaFeO3 of an element can be expressed By an Expansion into Direction Cosines α_1, α2, α3 With Respect To the Crystal Axes. Generalized equation of Longitudinal Mode, Transverse Mode Velocity, Minimum Thermal Conductivity Of LaFeO3can 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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