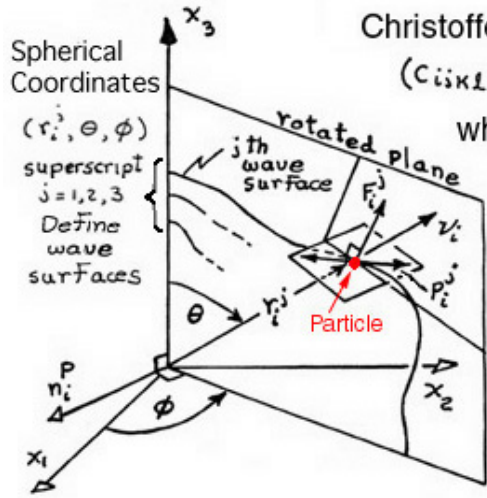


Anisotropic [Cijkl.data](#) Results: 3D Wave-Surfaces (Eigenvalues) and Their Corresponding Angular Deviations:

1) Particle Vibration (Eigenvectors), and 2) Energy Flux Propagation Direction: [Cijkl.out](#)



Christoffel's Equation

$$(C_{ijkl} v_i v_j - \rho v_i^2 \delta_{lk}) P_k^j = 0$$

where Eigenvalues,  $\rho v_i^2$   
 $v_i$  wave velocity

Eigenvectors,  $P_i^j$   
 (Particle vibration direction cosines)

$v_i$ , unit vector parallel to  $r_i^j$

$n_i^p$  = unit vector perpendicular to rotated plane

$v_i = r_i^j r_i^j$ , wave velocity

NOTE: j superscript not summed

Particle Displacement Visual Representation

Particle Displacement Angles  $\beta^j, \alpha^j$  Defined

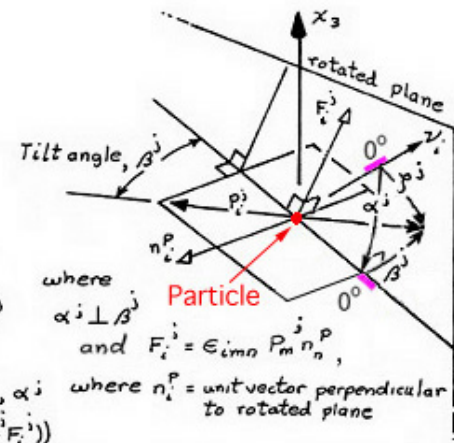
Displacement Deviation

$$\beta^j = \cos^{-1}(v_i P_i^j)$$

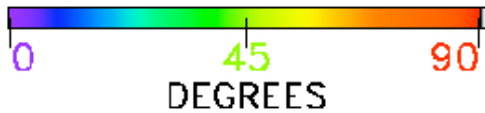
components:

- Out-of-plane Tilt angle,  $\beta^j$
- $\beta^j = \pi/2 - \cos^{-1}(n_i^p P_i^j)$

- Inplane Polarization angle,  $\alpha^j$
- $\alpha^j = \pi/2 - \cos^{-1}(F_i^j v_i / (F_i^j F_i^j))$



Energy Flux Deviation :  $\Delta^j = \cos^{-1}(C_{ijkl} u_{j,l} \hat{u}_k^j v_i)$



[Mercator Maps](#) of Angular Deviation Properties Mapped Onto Wave Surface

Topologies

[Image Types](#) (click on Mercator maps below to project these maps back onto their wave surfaces as image type 8 or select VRML and CAVE links to view same 3D wave surface projections as image type 1)

Wave surface geometries	Displacement deviations:	Out-of-plane component,	In-Plane component.	Energy flux deviation
Outer-most ("fastest") <a href="#">Gouraud Shaded Shape</a> superscript, j=1	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>
Intermediate ("slower") <a href="#">Gouraud Shaded Shape</a> superscript, j=2	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>
Inner-most ("slowest") <a href="#">Gouraud Shaded Shape</a> superscript, j=3	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>	 <a href="#">VRML-2</a> <a href="#">VRML-1</a> --> <a href="#">CAVE</a>
Wave surfaces combined <a href="#">isometric view of intersections</a>	<a href="#">*VRML-2</a> <a href="#">*VRML-1</a> --> <a href="#">*CAVE</a> * image type 1 with translucency	<a href="#">*VRML-2</a> <a href="#">*VRML-1</a> --> <a href="#">*CAVE</a> * image type 1 with translucency	<a href="#">*VRML-2</a> <a href="#">*VRML-1</a> --> <a href="#">*CAVE</a> * image type 1 with translucency	<a href="#">*VRML-2</a> <a href="#">*VRML-1</a> --> <a href="#">*CAVE</a> * image type 1 with translucency