

ELATE: Elastic tensor analysis

Welcome to ELATE, the online tool for analysis of elastic tensors, developed by **Romain Gaillac** and **François-Xavier Coudert** at [CNRS / Chimie ParisTech](#).

If you use the software in published results (paper, conference, etc.), please cite the [corresponding paper](#) (*J. Phys. Condens. Matter*, 2016, 28, 275201) and give the website URL.

ELATE is [open source software](#). Any queries or comments are welcome at fx.coudert@chimie-paristech.fr

Summary of the properties (3D material)



Input: stiffness matrix (coefficients in GPa) of

21.692	24.83	13.965	0.2541	-1.0904	-0.1153
24.83	42.576	19.409	0.9002	-1.1102	0.9063
13.965	19.409	274.1	-0.1283	0.7649	-0.0713
0.2541	0.9002	-0.1283	2.9155	-0.216	-0.583
-1.0904	-1.1102	0.7649	-0.216	2.7181	0.2909
-0.1153	0.9063	-0.0713	-0.583	0.2909	2.2818

Average properties

Averaging scheme	Bulk modulus	Young's modulus	Shear modulus	Poisson's ratio
Voigt	$K_V = 50.53$ GPa	$E_V = 53.615$ GPa	$G_V = 20.26$ GPa	$\nu_V = 0.32316$
Reuss	$K_R = 20.35$ GPa	$E_R = 8.6296$ GPa	$G_R = 3.0188$ GPa	$\nu_R = 0.42932$
Hill	$K_H = 35.44$ GPa	$E_H = 31.473$ GPa	$G_H = 11.64$ GPa	$\nu_H = 0.35199$

Eigenvalues of the stiffness matrix

λ_1	λ_2	λ_3	λ_4	λ_5	λ_6
1.772 GPa	2.5153 GPa	3.384 GPa	5.3663 GPa	56.519 GPa	276.72 GPa

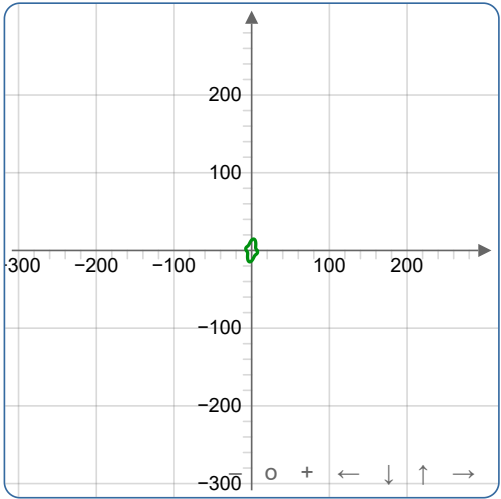
Variations of the elastic moduli

	Young's modulus		Linear compressibility		Shear modulus		Poisson's ratio		
	E_{\min}	E_{\max}	β_{\min}	β_{\max}	G_{\min}	G_{\max}	ν_{\min}	ν_{\max}	
Value	5.345 GPa	264.27 GPa	-11.258 TPa ⁻¹	60.413 TPa ⁻¹	1.6871 GPa	13.82 GPa	-0.44725	1.1452	Value
Anisotropy	49.44		∞		8.192		∞		Anisotropy
Axis	0.8256	-0.0057	-0.0374	0.9876	0.2688	0.1206	-0.0222	-0.0024	Axis
	0.3951	0.0020	0.9993	0.0377	0.9573	0.6904	0.0905	0.9989	
	0.4028	-1.0000	-0.0041	0.1524	-0.1068	0.7133	0.9956	0.0466	

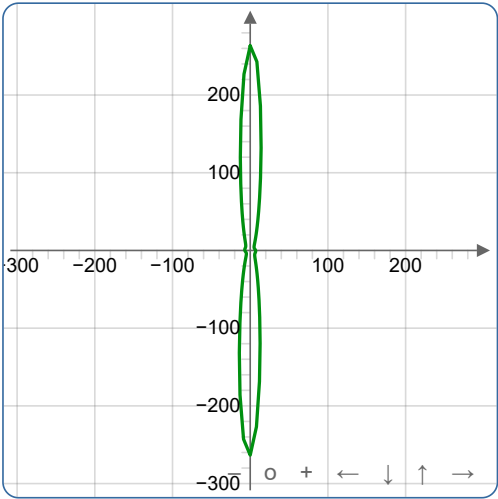
-0.8887	0.1349	-0.8341	-0.9999	Second axis
0.2037	0.7005	-0.5507	-0.0029	
-0.4107	-0.7008	0.0315	0.0100	

Spatial dependence of Young's modulus

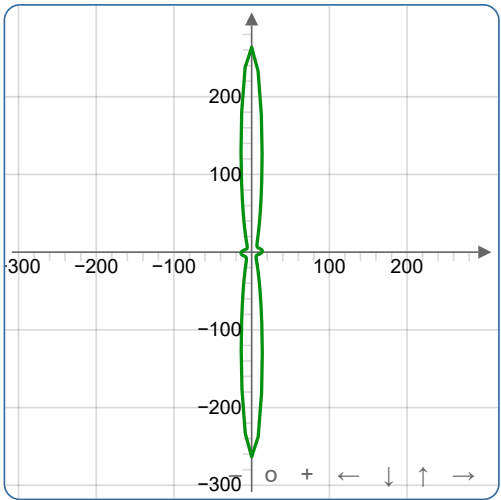
Visualize in 3D



Young's modulus in (xy) plane



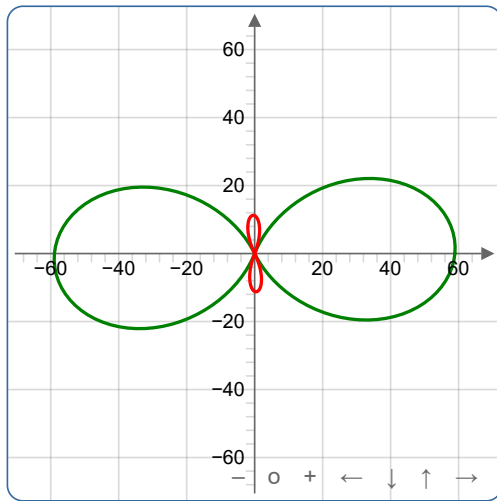
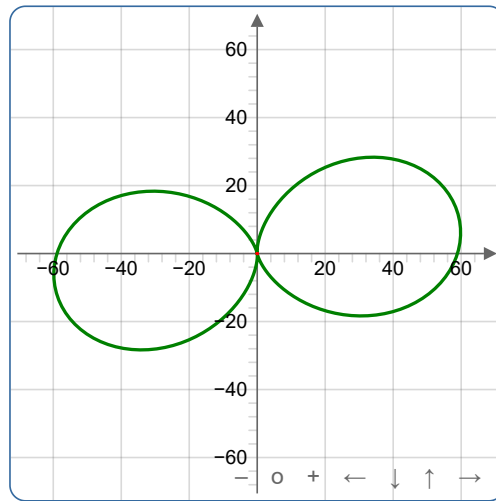
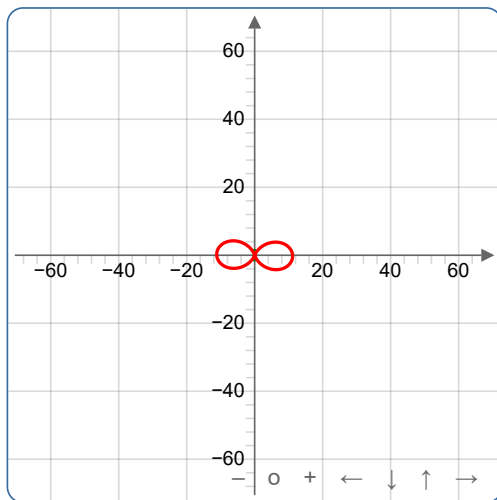
Young's modulus in (xz) plane



Young's modulus in (yz) plane

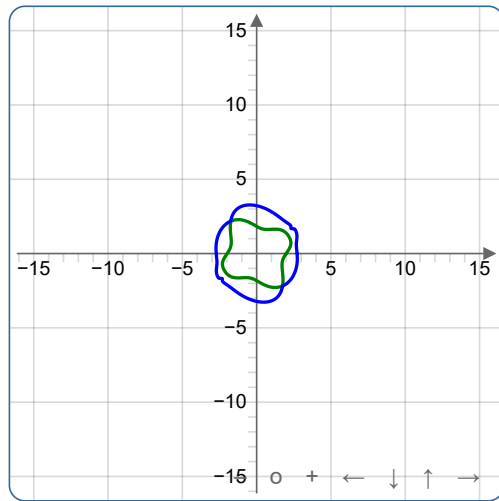
Spatial dependence of linear compressibility

Visualize in 3D

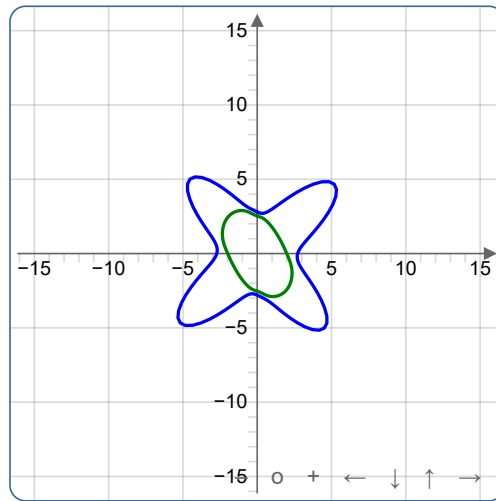
linear compressibility in (xy) planelinear compressibility in (xz) planelinear compressibility in (yz) plane

Spatial dependence of shear modulus

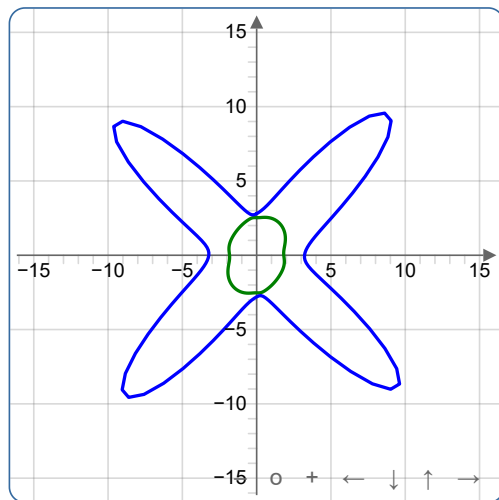
[Visualize in 3D](#)



Shear modulus in (xy) plane



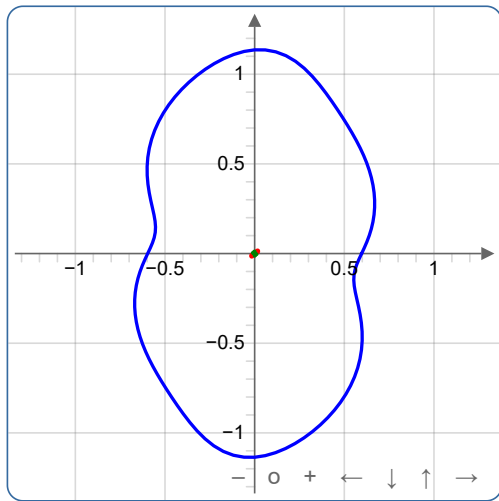
Shear modulus in (xz) plane



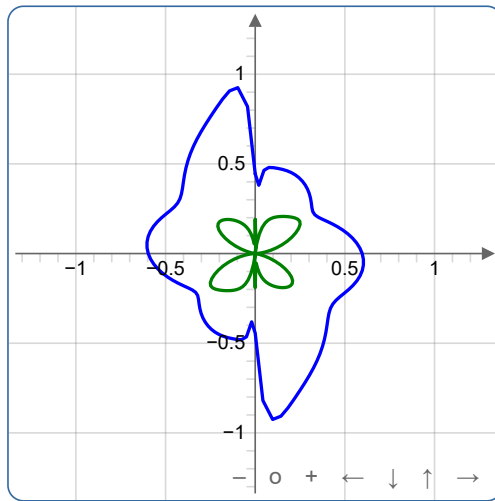
Shear modulus in (yz) plane

Spatial dependence of Poisson's ratio

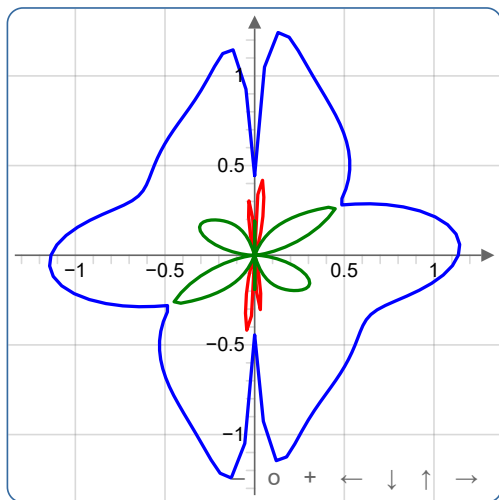
[Visualize in 3D](#)



Poisson's ratio in (xy) plane



Poisson's ratio in (xz) plane



Poisson's ratio in (yz) plane

Code version: 2024.03.15 (running on Python 3.11.2)
Execution time: 1.164 seconds