🌔 Murata Software

Q: How to perform the piezoelectric-harmonic analysis with viscoelasticity taken into account?

A: The dynamic modulus of a material is used to perform the analysis with viscoelasticity taken into account.

When viscoelasticity is taken into account, the material is treated as an isotropic material during calculations. To calculate the transverse modulus or shear modulus for the analysis, Poisson's ratio specified on the [Piezoelectricity] tab will be used.

Please refer to the next slide.



The piezoelectric-harmonic analysis can take into account viscoelasticity.

The dynamic modulus of a material is used to perform the analysis with viscoelasticity taken into account.

 $D^* = D(1 + j \tan \delta) = D_{re} + j D_{im}$

D*:Dynamic modulus, *D_{re}*:Storage modulus, *D_{im}*:Loss modulus

When viscoelasticity is taken into account, the material is treated as an isotropic material during calculations.

To calculate the transverse modulus or shear modulus for the analysis, Poisson's ratio specified on the [Piezoelectricity] tab will be used.

Edit Material Property [000_P-4 From material database]			Edit Material Property [000_P-4 From material database]		Edit Viscoela	sticity Table					
Density	Viscoelasticity Defined by ONO Viscoelasticity @Shear and Bulk		Density Piezoelectricity Viscoelasticity	Piezoelectricity	[Temp-Freq-Dynamic modulus] Table						
Piezoelectricity Viscoelasticity				Material Type Piezoelectric Material	No	No. Tempera requency	Storage 0.1 0.11		Insert Rows		
Notes	OProny Series [Coefficient Input] Shear only Optimatic Modulus [reng Response] Bulk only Optimatic Modulus [reng Price Response] Bulk only Relaxation Modulus Temperature Dependency and Shift Function Defined by Reference @WLF 0.0 @WLF 0.0 Ouser to define 10 8.86 X10	Bulk only	Notes	Dielectric Material (non-piezoelectric) OPerfect Conductor		3 00 4 000 5 0000	0.13 0	0.001 0.002 0.003	Import		
			Young's Modulus		6 7 8 9			Frequency <u>G</u> raph			
		[deg]		Poisson's Ratio	1 1 1 V Unit	1	kHz 🗸	GPa	GPa	Enter the following for ea Young's modulus for [She Shear modulus for [Shear Bulk modulus for [Bulk on	
	Shift Function Graph C2	0 🔹									