

Stress

- definition
- stress tensor
- definition and determination of principle stresses

Strain

- definition
- strain tensor

Tensors

- transformations
- compliance (S) and stiffness (C) tensors

σ - ϵ Relationships

- tensor form, compact notation
- isotropic, transversely isotropic, orthotropic, triclinic
- hydrostatic and deviatoric stress tensors
- bulk modulus

Composite Models

- Voigt, Reuss
- stress transfer / fiber fragmentation test
- Cox Model - discontinuous fiber composites and semicrystalline fibers
- Halpin-Kardos - discontinuous fiber composites and spherulitic structure
- Takayanagi

Rubber Elasticity

- internal energy vs. entropy as cause of restoring force
- Freely Jointed Chain, $\langle r^2 \rangle$
- Gaussian distribution function, entropy of one chain
- restoring force on one chain
- elasticity of ideal network rubber
- effective subchain density
- Langevin modification \rightarrow high α or small n
- freely rotating chain and hindered rotation $\rightarrow C_{\infty}, \langle r^2 \rangle_0$
- radius of gyration