

Constitutive models of linear viscoelasticity

- Viscoelastic materials, such as amorphous polymers, semicrystalline polymers, biopolymers and even the living tissue and cells, can be modeled in order to determine their stress and strain or force and displacement interactions as well as their temporal dependencies. These models, which include the Maxwell model, the Kelvin–Voigt model, and the Standard Linear Solid Model, are used to predict a material's response under different loading conditions. Viscoelastic behavior has elastic and viscous components modeled as linear combinations of springs and dashpots, respectively. Each model differs in the arrangement of these elements, and all of these viscoelastic models can be equivalently modeled as electrical circuits. In an equivalent electrical circuit, stress is represented by voltage, and strain rate by current. The elastic modulus of a spring is analogous to a circuit's capacitance (it stores energy) and the viscosity of a dashpot to a circuit's resistance