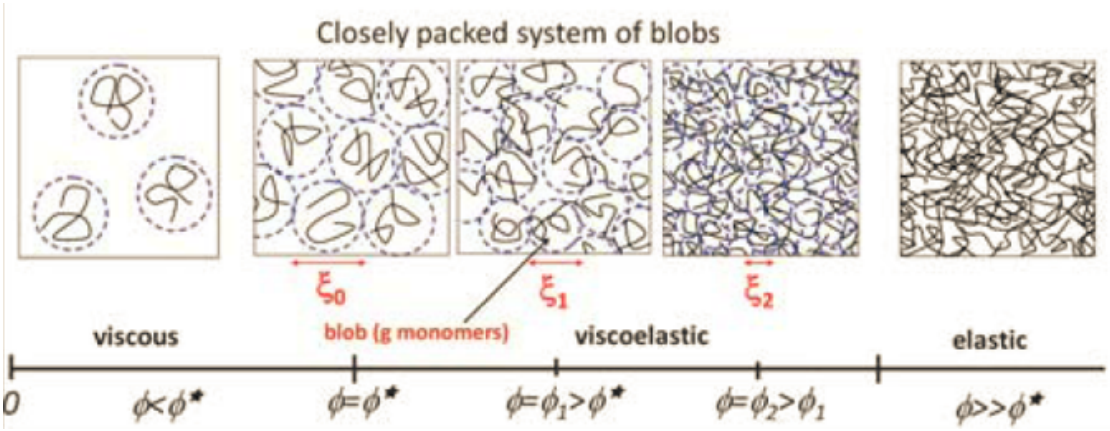
Untitled

May 30, 2024

1 Viscoelasticity



Viscoelsatic behavior is a mixture of viscous behavior, which we know already from simple liquids and elastic behavior, which is typical for solids. Yet, this mixture is not just a simple superposition but often quite complex and depdning on the way mechanical deformation is introduced.

insert sketch*

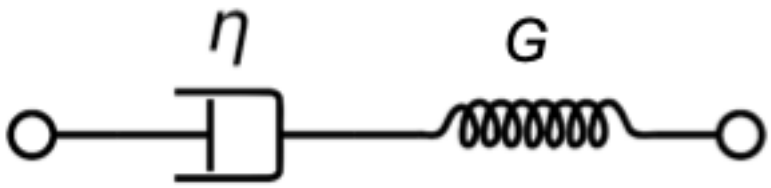
As already previously introduced, we can define a **shear stress**

$$\sigma = \frac{F}{A}$$

as the tangential force F to an area A. As a response to such a stress, the material deforms

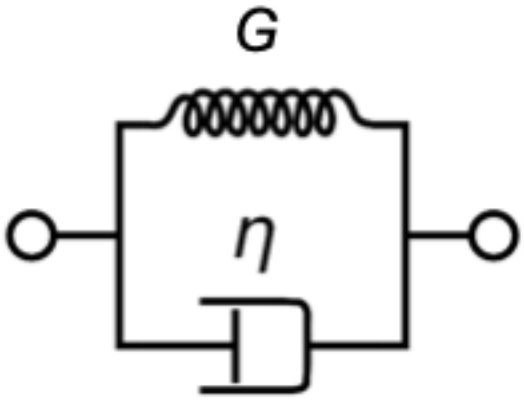
1.1 Maxwell Model

A model for a viscoelastic liquid is the Maxwell model being a serial combination of a spring and a dashpot (viscous element).



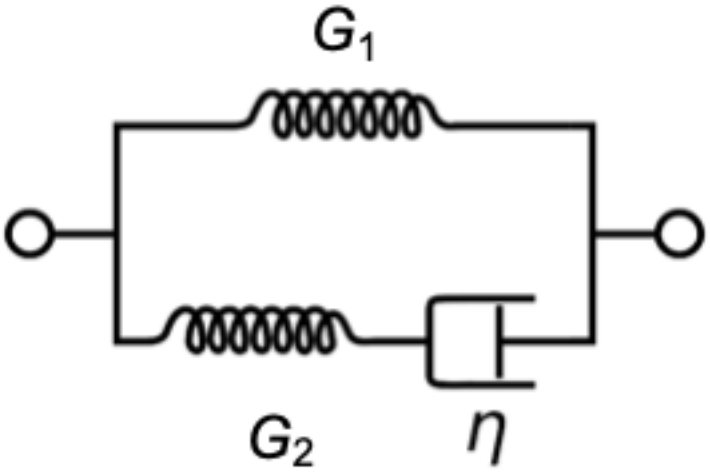
1.2 Kelvin-Voigt

The Kelvin-Voigt model is a parallel combination of both elements and can grasp some features of a viscoelastic solid. It can however not describe the behavior for step strain.



1.3 Standard Model

A better model for visoelastic solids is the standard linear solid model comprising three mechanical elements.


G_1
G_2
η