

Constitutive modelling of open-porous solids

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Paper ID: 673

[Symposium S14: Mechanics of porous and granular materials](#)

Abstract

In this contribution, constitutive modelling of open-porous solids will be discussed. A generalised model that accounts for the varying pore-size distributions in polydisperse pore-spaced solids will be first presented. The macroscopic stress-strain behaviour will be compared with experimental data for aerogels. In the second part, a modified neo-Hookean model will be proposed and presented. A strain energy density function is defined that accounts explicitly for the porosity and ensures physical realism and effective medium consistency by adopting the Hashin-Shtrikman bounds for moduli of porous solids. The model is validated against experimental data for super-flexible aerogels.

Keywords:

constitutive model porosity strain energy density neo-Hookean