

**Material Models for Hookean Materials with Voids or Cracks****Kari Santaoja**, Anniina Kuistiala*HUT, Helsinki, Finland*

Stress-strain relations for Hookean materials with spherical voids or penny-shaped microcracks are derived. The constitutive relation for voided material is based on the analytical expression by Eshelby whereas the theoretical work by Kachanov provided the foundation for the material model of microcracked material. The postulate of strain equivalence was shown to be incompatible with the analytical expression by Eshelby for porous material. Although the present formulation assumed that the microcracks are parallel, the extension for a multidirectional non-interactive microcrack field is evident. These two stress-strain relations play an important role in damage mechanics, since they are analytical solutions. They can be used in the verification of the assumptions of damage mechanics, such as the postulate of strain equivalence

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