

Extended Description of Pore Space Structure and Fluid Flow through Anisotropic Porous Materials

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This work concerns modelling of mechanical behavior of fluid in porous materials with anisotropic pore space structure. A new macroscopic description is proposed in which the motion of fluid in anisotropic pore space of skeleton is considered as a motion of material continuum in Minkowski (anisotropic) metric space. The applied model of pore space enabled obtaining an extended and self consistent description of pore structure and precise definition of its scalar and tensorial parameters. The formulated balance equations and constitutive relations for stress tensor in fluid and interaction force with skeleton allowed one to derive the generalized equations for wave propagation and the generalized Brinkman and Darcy equations describing fluid flow in porous materials with extended characteristics of pore structure anisotropy and nonsymmetric filtration properties.

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