Fluid-solid interactions in compressible porous media with two-parametric pore structure description(*)

J. KUBIK (POZNAŃ)

DYNAMIC equations for a compressible porous solid-fluid composition are discussed within the theory of interacting continua. Contrary to the volume fraction theory with one pore parameter, the porous solid is modelled by a theory for an inmiscible mixture with two-parametric pore structure description. The internal skeleton structure is defined by the volume porosity and the structural permeability parameter. This pore structure description allows one to disclose the virtual mass effect well-known for a single particle moving in an unbounded fluid and dynamic and inertial couplings between solid and fluid provoked by the pores.

Appropriate response functions for poroelastic material filled with viscous fluid and an evolution of the geometrical characteristics are proposed. Within a thermomechanical treatment of the problem the implications of the entropy inequality of the second law of thermodynamics are analysed.

It is shown that the proposed formulation including the coupling effects enables us to suggest a method of determining of the pore structure parameter from a harmonic wave analysis.

POLISH ACADEMY OF SCIENCES
INSTITUTE OF FUNDAMENTAL TECHNOLOGICAL RESEARCH.

(*) Unpublished