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**A semi-analytical solution for the confined compression of hydrated soft tissue.** (English)

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Summary: Confined compression is a common experimental technique aimed at gaining information on the properties of biphasic mixtures comprised of a solid saturated by a fluid, a typical example of which are soft hydrated biological tissues. When the material properties (elastic modulus, permeability) are assumed to be homogeneous, the governing equation in the axial displacement reduces to a Fourier equation which can be solved analytically. For the more realistic case of inhomogeneous material properties, the governing equation does not admit, in general, a solution in closed form. In this work, we propose a semi-analytical alternative to finite element analysis for the study of the confined compression of linearly elastic biphasic mixtures. The partial differential equation is discretised in the space variable and kept continuous in the time variable, by use of the finite difference method, and the resulting system of ordinary differential equations is solved by means of the Laplace transform method.

**MSC:**

74L15 Biomechanical solid mechanics

74F10 Fluid-solid interactions (including aero- and hydro-elasticity, porosity, etc.)

76S05 Flows in porous media; filtration; seepage

74S20 Finite difference methods applied to problems in solid mechanics

92C10 Biomechanics

Cited in 4 Documents

**Keywords:**

biphasic mixture; confined compression; finite differences; Laplace transform; continuum mechanics

**Full Text:** [DOI](#)

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