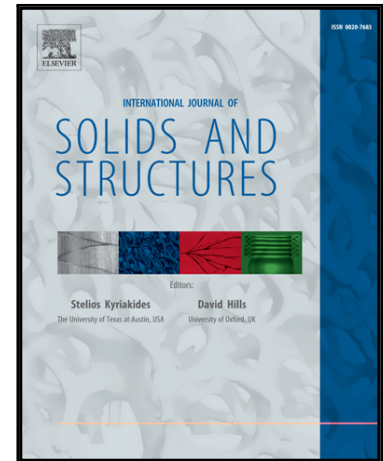


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Detection of nonuniform residual strain in a pipe

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Abstract

On the basis of the general linearized statement of the problem on motion of prestressed elastic anisotropic body, we formulate the boundary value problem on steady-state radial vibration of elastic isotropic pipe. We present a comparative analysis of the influence of residual stress and strain levels on frequency response functions of the pipe. We formulate the inverse problem on identification of the inhomogeneous residual stress-strain state on the basis of the additional data on the displacement function at the external radius measured in some frequency range. To solve the inverse problem, we propose a special iterative approach based on the regularization technique. A representative series of computational experiments on a reconstruction of different residual strain functions is conducted.

Keywords: Residual stress, residual strain, pipe, plane deformation, identification, regularization, inverse problem, acoustic method

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