

Some Plane Problems in Mechanics of Growing Solids

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We develop a theory of plane problems of mechanics of

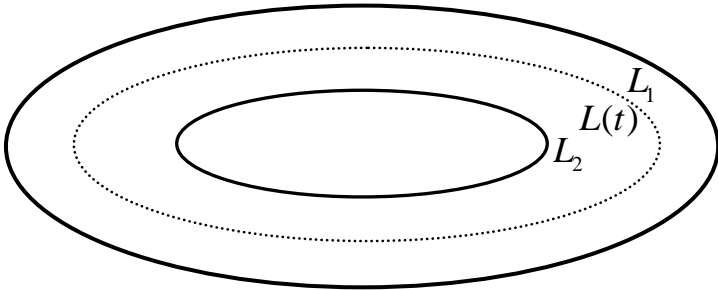


Figure 1: Overgrown hole.

growing solids. In the present paper, we develop a method for solving problems on the extension of a viscoelastic medium whose properties vary in time in the presence of holes of various shapes.

A viscoelastic body occupies a plane domain Ω_1 with boundary L_1 . At time $\tau_1 \geq \tau_0$, a continuous increase of the body starts. The growing body occupies the domain $\Omega(t)$ with boundary $L(t)$. At time $\tau_2 \geq \tau_1$, the growth stops, and from that time on the body occupies the domain $\Omega_2 = \Omega(\tau_2)$ bounded by the contour $L_2 = L(\tau_2)$.

The arising classical and nonclassical initial–boundary value problems of solid mechanics are considered. Methods for solving problems of mechanics of growing solids are proposed. These methods are based on (i) reduction of nonclassical problems of accretion of viscoelastic aging solids to problems of elasticity with a parameter, (ii) utilizing the theory of analytic functions for solving the latter problems, and (iii) reconstruction of the true stress-strain

state characteristics with the aid of the obtained decoding formulas.

The results of this research can be used for solving a number of important applied problems in mechanics of growing solids.

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