

On a Vibration Problem for Viscoelastic Kelvin-Voigt Prismatic Shells

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In [1] hierarchical models for porous elastic and viscoelastic Kelvin-Voigt prismatic shells on the basis of linear theories is constructed. Using I. Vekua's dimension reduction method, governing systems are derived and in the Nth approximation boundary value problems are set. The ways of investigation of boundary value problems (BVPs) and initial boundary value problems (IBVPs), including the case of cusped prismatic shells, are indicated and some preliminary results are presented.

In the zero approximation for porous elastic prismatic shells the following governing system has the following form (see [1])

$$\begin{aligned} \mu \left[(h v_{\alpha 0, \beta})_{, \alpha} + (h v_{\beta 0, \alpha})_{, \alpha} \right] + \lambda (h v_{\gamma 0, \gamma})_{, \beta} + b (h \psi_0)_{, \beta} + \overset{0}{X}_{\beta} &= \rho h \ddot{v}_{\beta 0}, \quad \beta = 1, 2, \\ \mu (h v_{30, \alpha})_{, \alpha} + \overset{0}{X}_3 &= \rho h \ddot{v}_{30}, \\ \tilde{\alpha} (h \psi_{0, \alpha})_{, \alpha} - b h v_{\gamma 0, \gamma} - \xi h \psi_0 + \overset{0}{H} &= \rho h \ddot{\psi}_0 - F_0. \end{aligned}$$

where $\lambda, \mu, \tilde{\alpha}, b, \xi$ are the constitutive coefficients, $2h(x_1, x_2)$ is the thickness of the prismatic shell, ρ is the reference mass density, $v_{i0} := \frac{u_{i0}}{h}$ ($i = 1, 2, 3$), $\psi_0 := \frac{\varphi_0}{h}$, u_{i0} and φ_0 are the zero moments of the displacements vector components and of the changes of the volume fraction from the matrix reference volume fraction, correspondingly, $\overset{0}{X}_i$ ($i = 1, 2, 3$), $\overset{0}{H}$, F_0 are given functions (see [1]). The points as superscripts mean differentiation with respect to the time, and Einstein's summation convention is used; indices after comma mean differentiation with respect to the corresponding variables of the Cartesian frame $Ox_1x_2x_3$.

The present talk is devoted to the harmonic vibration problem of the N=0 approximation of hierarchical models for porous elastic and viscoelastic Kelvin-Voigt cusped prismatic shells type materials.

References

- [1] G. Jaiani, hierarchical models for viscoelastic kelvin-voigt prismatic shells with voids. *Bulletin of TICMI*, **21**, No. 1 (2017), 33-44