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Spectral analysis of a viscoelastic tube conveying fluid with generalized boundary conditions

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The paper studies the spectral problem associated with the equation governing the small transverse motions of a viscoelastic tube of finite length conveying an ideal fluid. The boundary conditions considered are of general form, accounting for a combination of elasticity and viscous damping acting on both the slopes and the displacements of the ends of the tube. These include many standard boundary conditions as special cases. Explicit asymptotic formulas for the eigenvalues are derived for the case of generalised boundary conditions and the results are specialised to the fixed case and the case in which damping acts on the slopes but not on the displacements. In particular, the dependence of the eigenvalues on the parameters of the problem is investigated and it is found that all eigenvalues are located in certain sectorial sets in the complex plane.

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