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Linear Aspects of Stability in Flow Induced Oscillations of Cantilever Pipes: Application of a Popular Heuristic Algorithm ULLHAS HEBBAR[1], University of Cincinnati, OH, USA, ABILASH KRISHNAN, Arista Renewable Energies, Montreal, Canada, RAVIKIRAN KADOLI, National Institute of Technology Karnataka, India — This work studied linear aspects of flow induced oscillations in cantilever pipes, with an emphasis on the numerical method of solution adopted for the system of governing equations. The complex frequencies of vibration of the different characteristic modes of the system were computed as a function of the flow velocity, wherein multi-variable minimization was performed using the popular Nelder-Mead heuristic algorithm. Results for a canonical fluid-to-pipe mass ratio (β) were validated with literature, and the evolution of frequencies was studied for different mass ratios. Additionally, the numerical scheme was implemented to compute critical conditions of stability for the cantilever system as a function of β. Finally, interesting aspects of the dynamics of the system were analyzed: the supposed 'mode exchange' behavior, and an explanation for discontinuities observed in the critical conditions plotted as a function of β. In conclusion, the heuristic optimization based solution used in this study can be used to analyze various aspects of linear stability in pipes conveying fluid.

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Ullhas Hebbar
University of Cincinnati, OH, USA

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