

Abstract Submitted
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Influence of gravity on flutter of cantilevered pipes conveying fluid¹ JAVIER RIVERO, MIGUEL PEREZ-SABORID², Dep. Ingeniería Aeroespacial y Mecánica de Fluidos, Universidad de Sevilla, Sevilla 41092, Spain — We have considered the dynamics of the nonlinear interaction between a flexible pipe and the conveyed fluid in the presence of gravity. The stability of the system (flutter and buckling) depends on parameters such as the dimensionless fluid flow rate, the gravity to bending stiffness ratio and the fluid to pipe mass ratio and it has been studied in detail both numerically and experimentally. It has also been found that the stabilizing or destabilizing effects of fluid flow depends crucially on the direction of gravity respect to the undeformed midline of the pipe. We have also computed the post-critical behavior of the system by solving the full nonlinear equations of the problem and analyzed the transfer of energy within the system in the nonlinear regime. We have formulated the problem in terms of the angles of the midline of the pipe instead of its transverse displacements, so that we can deal with large deflections without recurring to the quasi-linear approximations concerning the pipe curvature usually made in the literature.

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