

**Rational Decay Rates for Solutions of a Structural Acoustics PDE model with
no Additional Dissipative Feedback**

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Abstract: A rate of *rational decay* is obtained for solutions of a PDE model which has been used in the literature to describe structural acoustic flows. This structural acoustics PDE consists partly of a wave equation which is invoked to model the interior acoustic flow within a given cavity. Moreover, a structurally damped elastic equation is invoked to describe time-evolving displacements along the flexible portion of the cavity walls. The coupling between these two distinct dynamics will occur across a boundary interface. We obtain the uniform decay rate of this structural acoustic PDE without incorporating any additional boundary dissipative feedback mechanisms. By way of deriving this stability result, necessary *a priori* inequalities for a certain static structural acoustics PDE model are generated, thereby allowing for an application of a recently derived resolvent criterion for rational decay.