1125-35-581 **Justin T Webster*** (websterj@cofc.edu), 66 George Street, Charleston, SC 29424. *Modeling Challenges for the Flutter of a Cantilevered Structure in a Flow.*

Flutter is a (bounded response) instability brought about by the interaction of an elastic structure with a surrounding fluid flow. Here, we describe the difficult problem of modeling the phenomenon for thein structures where a portion of the boundary is free. Beyond the obvious applications in aeroscience, flutter arises in: (i) biomedical applications (sleep apnea), and (ii) sustainable energy (providing a low-cost power generation). Modeling, predicting, controlling, and preventing flutter has been a foremost engineering problem engineering for nearly 70 years. Mathematically, there is a lack of well-posedness and long-time analysis.

We discuss recent results for mathematical models of panel flutter; this simpler situation involves a nonlinear structure coupled to a perturbed wave equation with the entire structural boundary restricted. We then discuss the ways in which the analysis breaks down when a portion of the structure's boundary is free. The challenges in the analysis can be viewed as reflections of the difficulty in modeling the physics of the problem. Various recent results will be discussed for multiple models which address in/stability, along with recent numerical simulations. (Received September 06, 2016)