1125-35-2583 **Ryan Honan Pellico*** (ryan.pellico@trincoll.edu), Department of Mathematics, 300 Summit Street, Hartford, CT 06106. *Periodic Oscillations in a Nonlinear Suspension Bridge Model.*

A nonlinear system of partial differential equations is presented to model the vertical motions of the roadbed and main cable of a suspension bridge. The model couples a beam equation and wave equation via a "one-sided" Hooke's Law, which accounts for the fact that the suspension cables may lose tension if the roadbed rises high enough. This behavior was observed before the collapse of the Tacoma Narrows Bridge. Using numerical continuation and stability analysis, we provide numerical evidence and bifurcation diagrams demonstrating the existence of multiple stable periodic responses to the same periodic forcing. Separable solutions are investigated using methods for ordinary differential equations while more general solutions are investigated using a finite difference scheme and an implicit-explicit initial value solver. The method of steepest descent is also used to find entirely new branches of periodic solutions. (Received September 20, 2016)