

28th Southeastern-Atlantic Regional Conference on Differential Equations, October 10–11,  
2008, University of Arkansas at Little Rock, Little Rock Arkansas, USA

Coauthors: Carmen Chicone

## **A FIELD THEORY TWO-BODY PROBLEM IN ACOUSTICS**

MICHAEL T. HEITZMAN

An acoustic model is developed to illustrate a scheme for obtaining effective equations of motion for sources in field theories, where finite propagation speeds lead to radiation reaction and runaway solutions. The model is a hybrid system of PDEs for fluid pressure and velocity fields, coupled to ODEs for pistons that bound the fluid at each end. Elimination of the fields yields neutral functional differential equations for the pistons. Effective equations of motion are obtained by reduction to an inertial manifold, and may be approximated by expansion, truncation, and reduction to a slow manifold of a singular perturbation problem.

UNIVERSITY OF MISSOURI

*E-mail address:* `heitzman@math.missouri.edu`