

ACOUSTICS2008/1480
The response of a complex dynamical system to a complex external forcing

John McCoy
Catholic University, 620 Michigan Ave, Washington, DC 20064, USA

The response of a dominant grounded spring/mass to which are attached a large number of significantly less massive sprung masses, when subject to an external forcing acting on the dominant mass, is revisited. Distinguishing the new study is a focus on the net force that the attached systems cause to act on the dominant mass and the derivation of a semi-analytic, time domain representation of the system operator that transforms the history of the external force acting on the adorned dominant spring/mass to the history of an effective force that acts on the unadorned dominant spring/mass. The mathematical framework provided by the concept of an "effective force" acting on the unadorned simple system gives additional insight to a commonly accepted concept of an "effective dissipation" modifying the unadorned simple system, when subject to simple external force histories; i.e., force histories with limited time extents or with limited bands of spectral content. Of greater practical interest is the mathematical framework allows investigation of external force histories that are not simple.