SM3L_12756

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Optimization of Active Control of Structural Vibration by the Beam Analogy

Walerian Szyszkowski, Manish Baweja

Unuversity of Saskatchewan, Dept. of Mechanical Engineering, Saskatoon, Canada

A numerical approach based on the finite element method to determine the optimal action of a set of discrete actuators controlling vibration of elastic structures is presented. The approach uses an analogy between the optimality equations for the problem in the time domain and the governing equations for a certain set of static beams in the spatial domain. Consequently, the finite element model for the optimality equations can be built of fictitious 2-D beams. Applying standard hermitian beam elements easily solves static displacements and forces in these beams. The results are then transferred to the time domain to describe the optimal dynamic response of the structure. The analogy (referred to as the beam analogy) allows for an efficient application of the finite element method to solve optimal active vibrations attenuation problems for open- and closed-loop control schemes. Simple numerical examples will illustrate the approach.

View the extended summary