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Vibration isolation and wave attenuation of coated sphere-filled metaconcrete rods under an impact load

Chang Li[1, 2*], C.Q. Ru[2]

[1]State Key Laboratory of Mechanics and Control of Mechanical Structures, Nanjing University of Aeronautics and Astronautics, Nanjing 210026, China

[2]Department of Mechanical Engineering, University of Alberta Edmonton, AB T6G 2G8, Canada

*cli21@ualberta.ca

ABSTRACT

Coated sphere-filled metacomposites are a new type of composite materials with novel dynamic properties for vibration isolation and wave attenuation. Based on the concept of the displacement field of the mass center of representative unit cell, a new analytical model is presented to study dynamics of coated sphere-filled random metacomposite (called "metaconcrete") rods under an end impact load. By comparing its predicted results with known numerical and experimental data reported in recent literature, the efficiency and accuracy of the present model are demonstrated and verified. In particular, effects of the radius and volume fraction of embedded rigid spheres, the elastic modulus and thickness of soft coating layers on the bandgap and vibration and wave dynamics of coated sphere-filled metaconcrete rods are investigated.

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