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Damping behavior of nano-fibrous composites with viscous interface in anti-plane shear.

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Summary: By using the composite cylinder assemblage model, we derive an explicit expression of the specific damping capacity of nano-fibrous composite with viscous interface when subjected to time-harmonic anti-plane shear loads. The fiber and the matrix are first endowed with separate and distinct Gurtin-Murdoch surface elasticities, and rate-dependent sliding occurs on the fiber-matrix interface. Our analysis indicates that the effective damping of the composite depends on five dimensionless parameters: the fiber volume fraction, the stiffness ratio, two parameters arising from surface elasticity and one parameter due to interface sliding.

MSC:

74G05 Explicit solutions of equilibrium problems in solid mechanics
74Q10 Homogenization and oscillations in dynamical problems of solid mechanics
74A60 Micromechanical theories
35Q74 PDEs in connection with mechanics of deformable solids

Keywords:

nano-fiber; surface elasticity; interface sliding; composite cylinder assemblage; effective property; specific damping capacity

Full Text: DOI

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