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VIBRATION ANALYSIS OF VISCOELASTIC SANDWICH STRUCTURE WITH SLIPPAGE AT THE INTERFACE

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In the engineering fields, perfect bonding will not always be provided in the viscoelastic sandwich structure duo to the factors such as bonding technology, life cycle, etc. As to imperfect bonding, the slippage between layers at the interface will occur and affect the dynamic characteristic and damping properties of the viscoelastic sandwich structure. By introducing the slippage parameter, the transverse and in-plane displacement fields at the elastic face are improved and described in terms of the displacement field at the core layer and the slippage field at the interface based on Hoff sandwich plate theory. According to reciprocal theorem of shear stress, the slippage field is figured out and compatibly introduced into the displacement fields model. Based on constitutive equations, the stress field is expressed in the form of the displacement field and the vibration control equations considering slippage at the interface are established by equilibrium equations. Under the boundary condition of the simply supported on four sides, the modal loss factor and the dynamic characteristic are analytically formulated which can be used to quantificational estimate the influence of the slippage at the interface. Finally, an example is presented and the result shows how the bonding condition at the interface affects the dynamic characteristic and damping properties, and the influence is related to the structural parameters such as thickness ratio in the viscoelastic sandwich structure.

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