

Vibrations of Thin Bio Composite Plates

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Abstract : The use of natural fibers as reinforcements is growing increasingly in polymers which are involved in e.g. structural, vibration, and acoustic applications. The use of bio composites is being investigated as lightweight materials with specific properties like the ability to dissipate vibration energy and positive environmental profile and are thus considered as potential replacements for synthetic composites. The macro-level mechanical properties of the biocomposite material depend on several parameters in the detailed architecture and morphology of the reinforcing fiber structure. The polymer matrix phase is often applied to remain the fiber structure in touch. A big role in the packaging details of the fibers is related to the used manufacturing processes like extrusion, injection molding and treatments. There are typically big variances in the detailed parameters of the microstructure fibers. The study addressed the question of how the multiscale simulation methodology works in bio composites with short pulp fibers. The target is to see how the vibro - acoustic performance of thin-walled panels can be controlled by the detailed characteristics of the fiber material. Panels can be used in sound-producing speakers or sound insulation applications. The multiscale analysis chain is tested starting from the microstructural level and continuing via macrostructural material parameters to the product component part/assembly levels. Another application is the dynamic impact type of loading, exposing the material to the crack type damages that is in this study modeled as the Charpy impact tests.

Keywords : bio composite, pulp fiber, vibration, acoustics, impact, FEM

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