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SHPB Technique for Identification of Complex Modulus Under Condition of Non-Uniform Stress

S. Mousavi, U. Valdek, K. Welch, B. Lundberg

The Angstrom Laboratory, Uppsala, Sweden

In classical SHPB (Split Hopkinson Pressure Bar) testing, the specimen is assumed to be in equilibrium and have axially uniform stress. An SHPB procedure was developed for non-parametric identification of complex modulus under conditions of non-equilibrium and axially non-uniform stress. A simplified procedure was also established. Tests were carried out with polymethyl methacrylate and aluminium bars, and polypropylene specimens having diameter 20 mm and lengths 10, 20, 50 and 100 mm. The complex moduli identified with the full pro-cedure are in good or fair agreement with each other and with published results in the fre-quency range 1–10 kHz for all specimens with polymethyl methacrylate bars and for the 10–50 mm specimens with aluminium bars. With the simplified procedure, identical with classical SHPB 1-wave procedure, the magnitude of the complex modulus was overestimated. The overestimation increases with frequency, specimen length and the magnitude of the specimen-to-bar characteristic impedance ratio.

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