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Slow Dynamics Diagnosis of Asphalt Concrete Specimen to Determine Level of Damage caused by Static Low Temperature Conditioning

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The phenomenon of slow dynamics has been observed in a variety of materials which are considered as relatively homogeneous that exhibit nonlinearity due to the presence of defects or cracks within them [1]. Experimental realizations in previous work suggest that slow dynamics can be in response to acoustic drives with relatively larger amplitude as well as rapid change of temperature [2]. Slow dynamics as a nonlinear elastic response of damaged materials is manifested as a sharp drop and then recovery of resonance frequency linearly with logarithmic time. In this work, slow dynamics recovery is intended to be used as a means of identifying and evaluating thermal damage on asphalt concrete specimen. The experimental protocol for measuring slow dynamics is based on the technique of nonlinear resonance spectroscopy and is set up with non-contact excitation using loud speaker and data acquisition tool box of Matlab. Sweeps of frequency with low amplitude are applied in order to probe the specimen at its linear elastic state. The drop and then recovery in resonance frequency is observed after the specimen is exposed to thermal shock. The investigation of this property can help in studying how asphalt concrete behaves with respect to its state of damage.

References:

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