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Correlated Time-Variation of Asphalt Rheology and Bulk Microstructure ADAM RAMM, Dept. of Physics, Univ of Texas, Austin, SAKIB NAZMUS, AMIT BHASIN, Dept. of Civil Engineering, Univ of Texas, Austin, MICHAEL DOWNER, Dept. of Physics, Univ of Texas, Austin — We use non-contact optical microscopy and optical scattering in the visible and near-infrared spectrum on Performance Grade (PG) asphalt binder to confirm the existence of microstructures in the bulk. The number of visible microstructures increases linearly as penetration depth of the incident radiation increases, which verifies a uniform volume distribution of microstructures. We use dark field optical scatter in the near-infrared to measure the temperature dependent behavior of the bulk microstructures and compare this behavior with Dynamic Shear Rheometer (DSR) measurements of the bulk complex shear modulus $|G^*(T)|$. The main findings are: (1) After reaching thermal equilibrium, both temperature dependent optical scatter intensity ($I(T)$) and bulk shear modulus ($|G^*(T)|$) continue to change appreciably for times much greater than thermal equilibration times. (2) The hysteresis behavior during a complete temperature cycle seen in previous work derives from a larger time dependence in the cooling step compared with the heating step [1]. (3) Different binder aging conditions show different thermal time-variations for both $I(T)$ and $|G^*(T)|$. [1] Ramm, A., *et. al.*.(2016), Journal of Microscopy, 262: 216-225.

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