

## **SIMULATION OF ASPHALT CONCRETE PLASTIC DEFORMATION BEHAVIOR**

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### *ABSTRACT*

This paper presents Discrete Element Method (DEM) simulation results of the plastic deformation resistance of asphalt concretes subjected to the loading prescribed for the Asphalt Mixture Performance Test (AMPT). This consists of a repetitive vertical axial stress of 690 kPa for 0.1 sec followed by a rest period of 0.9 sec. Nine asphalt concretes were considered. These consisted of three mix designs, each prepared with three aggregate types and the same PG 76-22 binder. Their microstructure was captured by X-Ray tomography and processed to be input into DEM analysis. The viscoelastic properties of the asphalt mastics were obtained by fitting Burger models on frequency sweep DSR test data. The Flow Number (FN) values were obtained by fitting Francken models to the computed plastic deformation results. Plastic deformation resistance rankings for the nine mixtures were developed in terms of the simulated FN values. These rankings were in reasonable agreement with the plastic strain rankings obtained from uniaxial creep laboratory testing.