

Correction of compliance errors in the dynamic shear modulus of bituminous binders data

Abstract

The dynamic shear rheometer (DSR) is one of the most complex and powerful instruments currently used to characterise the linear viscoelastic (LVE) rheological properties of bituminous binders. However, the DSR also has its limitations in that the measured complex modulus data are exposed to errors, known as compliance (testing) errors, particularly at low temperatures and/or high frequencies. This study was conducted to investigate the validity of equations developed by Schröter and associates on complex modulus data collected using the DSR. The equations used were originally developed based on the calibration of the advanced rheometric expanse system (ARES) rheometer. It was found that those equations are able to satisfactorily correct the data on unmodified bitumens and unaged bitumen-filler mastics, including unaged and aged samples. Similar results were also observed for storage and loss moduli master curves. Finally, the 2S2P1D Model was used to calibrate the corrected complex moduli data and it was found that the model satisfactorily simulates the rheological properties of tested samples.

Keyword: Bitumen-filler mastic; Compliance errors; Linear viscoelastic; Modelling; Unmodified bitumen