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Rheological Properties of Polyethylene-Modified Asphalt Binder

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Abstract: Polyethylene (PE) is the most common type of plastic. In daily life, plastic bags, plastic bottles, and many other PE products are seen everywhere. Significant amount of plastics are not disposed properly and therefore present as waste material in the environment. Using polyethylene as an additive to asphalt binders may be considered a good way to utilize this material. However, modified asphalt binder properties should be investigated. Rheological properties at higher temperatures of asphalt binders modified with PE are investigated in this study. PE was added to asphalt binder at different percentages by volume of asphalt binder. These percentages were: 3, 4, 5, 6, and 7%. The rheological properties included: the rotational viscosity (RV), asphalt binders complex shear modulus (G^*), and the phase angle (δ). It was found that the increase of PE to asphalt binder (PE/A) ratio increased the complex shear modulus (G^*) and the rotational viscosity (RV) of asphalt binders. Furthermore, the rutting parameter ($G^*/\sin \delta$) was improved. However, the PE/A ratio have no significant effect on the phase angle.