

Performance-Related Test for Asphalt Emulsion

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Problem

The viscosity of polymer-modified emulsions is a function of shear rate. Measurement of viscosity at a single shear rate is not ideal for these materials.

The rheological properties of polymer modified emulsions play an important role in materials processing. Yield stress, defined as the minimum stress that must be applied on a material to induce flow is an important rheological property for

emulsions. In an emulsion, particles/droplets dispersed in a liquid medium can interact with each other to create a continuous, three-dimensional network, precluding flow at low stress. Such a system flows only when the stress is large enough to degrade the structure.

Thus, yield stress may be seen as a critical parameter in predicting functional performance of an

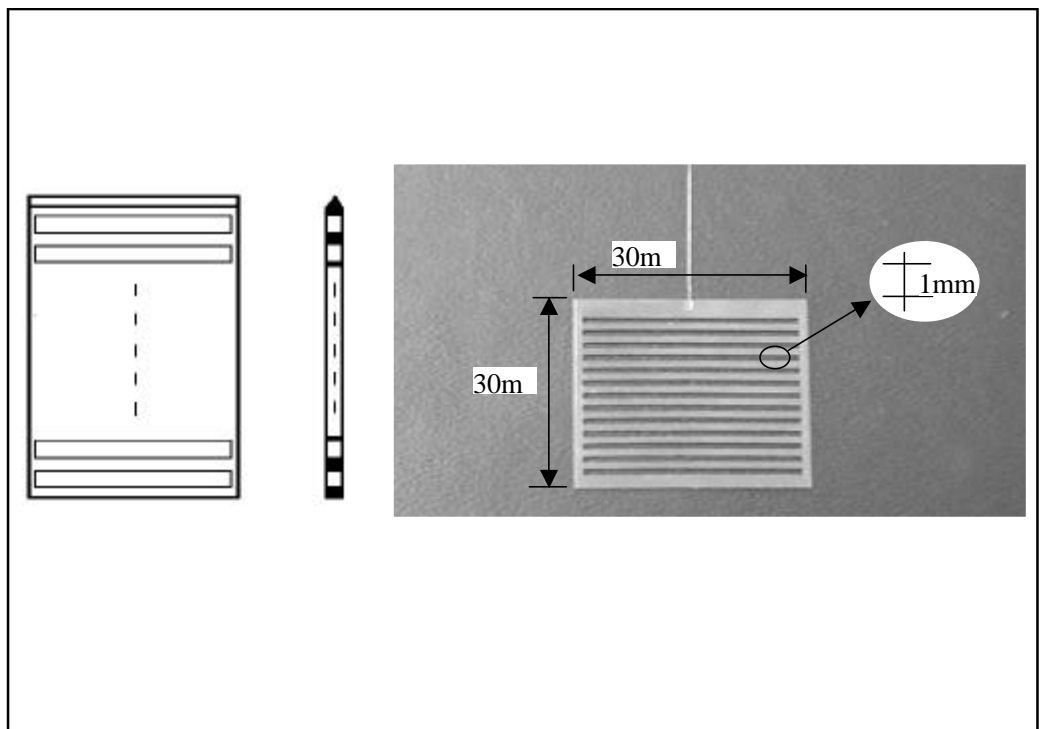


Figure 1: Schematic diagram of perforated plate surface



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emulsion. The accurate measurement of yield stress will improve the ability to quantify the production limits and thereby improve material quality control and assurance. Although there have been several techniques (e.g., Saybolt viscometer, rotational viscometer) devised for the indirect measurement of yield stress, no satisfactory direct measurement of this property has yet been accepted.

Objective

The objective of this exploratory project is to perform direct yield stress measurements with a modified plate device that has been developed by the principal investigator.

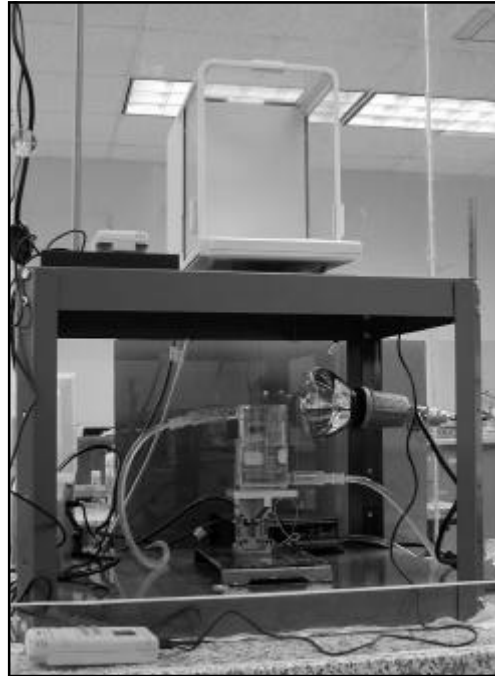


Figure 2: Photograph of the plate device for yield stress measurements

Description

Representative samples of emulsions used on state projects will be tested for yield stress using the modified plate device. Comparison data will be obtained using Saybolt and rotational viscometers. Measurements taken with the modified plate device will be compared with this data.

Implementation Potential

Based on findings from this exploratory research, a determination will be made as to whether the modified plate device, discussed herein, provides an improved test for the performance specification of asphalt emulsions. If determined to be feasible, more elaborate research will be justified.