Performance of Nano Silica as Modified Binder to Improve Rutting and Fatigue Resistance

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Abstract:
Nowadays, the utilisation of nanoparticle towards asphalt modification is increasing gradually. Nanomaterial is also potentially suitable in overcoming the problem related to polymer materials. Among the potential nanomaterial is nanosilica (NS), where this material is usually obtained from various natural sources like palm oil fuel ash as well as rice husk. Thus, this study intended to promote nanosilica as asphalt modifier to increase the property of penetration grade (PEN 60-70) asphalt binder in terms of fatigue index and rutting index values. The test involve is temperature sweep using Dynamic Shear Rheometer (DSR) equipment. This test is crucial to evaluate the performance of modified asphalt binder towards various temperature and ageing conditions. The results show that 2% NS-MB provide the highest rutting index value, while 3% NS-MB produced the highest value of fatigue index. This clearly indicated that the existence of nanosilica provides better rutting resistance and fatigue resistance of asphalt binder under various temperatures and stresses.

Keywords: Binder; Fatigue; Nanosilica; Rutting

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