

A Fuzzy Inference System Based Asphalt Surface Deterioration Prediction Model Due to Combined Interaction of Dynamic Loading-Water-Pavement

Saeed Fauzia, Mujib Rahman, Maher Mahmood, Philip Collins

A B S T R A C T

A Fuzzy Inference System (FIS) based deterioration prediction models has been developed in two stages. Firstly, experimental work was conducted to evaluate the performance of asphalt surfaces due to the combined action of water and dynamic loading. Then, a FIS model was developed using high dimensional inputs, such as three types of asphalt surfaces, three aggregate sizes, and two weather conditions (dry and wet), and repeated loading at two frequencies. The two outputs of the model, i.e., cracking and rutting, showed excellent agreements with the experimental measurement of cracking and rutting. The validation and sensitivity analysis were also conducted to evaluate the model performance and to evaluate the influence of each input parameters on distress prediction. The FIS models demonstrated the potential for further development as a routine prediction model to differentiate the performance of asphalt surfaces subjected to dynamic loading while submerged in water.