ABSTRACT

Truck platooning are expected to have several advantages including congestion reduction, improving braking acceleration, overall safety, traffic flow and fuel efficiency. However, the platoons might result in negative pavement performance due to channelized traffic and reduced spacing. This research aims to couple advanced Finite Element (FE) pavement models with an experimental program to assess the effect of truck platooning on pavements’ fatigue and permanent deformation. FE models were utilized to assess the effect of different platoon speeds and pavement temperature profiles on strain recovery. Transverse strain at bottom of AC layer was critical due to lower recovery. When strain recovery is considered, transverse strain for higher speeds could be critical. Hence, accumulation effect should be considered for fatigue calculation. The laboratory work involved simulating different scenarios of truck platoons by performing a fundamental permanent deformation test utilizing several stress and temperature levels, binder types and rest periods. It was noticeable that all four parameters have a distinct impact on pavements’ permanent deformation. Predominantly, it was clear that when the rest periods decrease, the overall permanent deformation also decreases due to the AC hardening-relaxation phenomenon. Rest period should be included as part of loading to accurately determine AC permanent deformations.