# DEVELOPMENT OF PROBABILISTIC S-N CURVE USING SMALL SAMPLE DATA

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*ABSTRACT*
Due to its inherent nature, fatigue damage process is more prone to more uncertainty. To improve the reliability, large number of specimens is tested at individual strain amplitude levels. This renders experimental investigation a resource and time intensive exercise. This article presents an approach to develop probabilistic fatigue curve using small-sample fatigue data for asphalt concrete mixtures. This approach uses the statistical parameters obtained at different strain amplitude levels, and mapped failure trajectories to predict fatigue life for given survival probability. The asphalt concrete fatigue data reported in NCHRP 646 study is used to present a numerical example. Some advantages of proposed approach are (i) reduction in sample requirement and testing time requirement, and (ii) possibility of construction of probabilistic fatigue curve with limited data when other techniques fail (due very small sample size ~2 at each strain level). This probabilistic fatigue curve can be easily incorporated into reliability based mechanistic-empirical pavement design.