



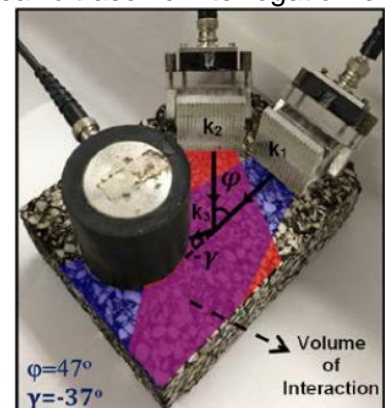
Oxidative Damage Quantification of Aged and Rejuvenated Asphalt Concrete Pavements



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ABSTRACT

A nondestructive approach to estimate the state-of-damage due to oxidative-aging in asphalt concrete (AC) pavements is presented. The approach, which is based upon nonlinear ultrasonic interrogation of the pavement top material layer, consists in analyzing the resultant wave field of the non-collinear mixing of two critically refracted longitudinal ultrasonic waves. Using two non-collinear ultrasonic wave mixing parameters, a two-dimensional “oxidative-aging characterization curve” is developed that uniquely characterizes the nonlinear response of asphalt concrete mixtures with increasing levels of oxidative oven-aging. This curve, which is AC-mixture-dependent only, serves as the calibration curve that allows pavement prognosis by nonlinear ultrasonic measurements at the pavement surface. The use of this approach in pavement engineering to assess the self-healing capacity of pavements and to evaluate maintenance treatments on asphalt pavement surfaces, such as the use of penetrating rejuvenators is discussed.



Key Words: Asphalt concrete, pavements, damage, oxidative aging, rejuvenators, pavements sustainability