structral identification of strength degrading hysteresis using Nondimensionalized bouc-wen model

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ABSTRACT

This study proposes nondimensionalized Bouc-Wen model, which describes hysteretic behavior with yield displacement, and the nondimensional hysteresis displacement is bounded between -1 and 1. In the proposed model, the dissipated energy is almost equivalent to the displacement per cycle and can be interpreted as the dissipation per an equivalent number of cycles. This interpretation enables us to assign a physical meaning to the degradation per cycle. The applicability of the proposed model was experimentally validated based on an unscented Kalman filter--based parameter identification technique. The identification results show that the nondimensionalized Bouc--Wen model can eliminate the over-fitting problem by converting one hysteresis variable into a variable that can be physically specified as the yield displacement. The convergence rate in estimating the strength and stiffness reduction coefficients was increased as a result of the proposed nondimensionalization.