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Global Direct Search Optimization of a Tuned Liquid Column Damper Subject to Stochastic Load

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Abstract : In this paper, a global direct search optimization algorithm to reduce vibration of a tuned liquid column damper (TLCD), a class of passive structural control device, is presented. The objective is to find optimized parameters for the TLCD under stochastic load from different wind power spectral density. A verification is made considering the analytical solution of an undamped primary system under white noise excitation. Finally, a numerical example considering a simplified wind turbine model is given to illustrate the efficacy of the TLCD. Results from the random vibration analysis are shown for four types of random excitation wind model where the response PSDs obtained showed good vibration attenuation.

Keywords : generalized pattern search, parameter optimization, random vibration analysis, vibration suppression
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