

Investigation of Multiple Dynamic Vibration Absorbers' Performance in Overhead Transmission Lines

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Abstract : As the electric energy consumption grows, the necessity of energy transmission lines increases. One of the problems caused by an oscillatory response to dynamical loads (such as wind effects) in transmission lines is the cable fatigue. Thus, the dynamical behavior of transmission cables understanding and its control is extremely important. The socioeconomic damage caused by a failure in these cables can be quite significant, from large economic losses to energy supply interruption in large regions. Dynamic Vibration Absorbers (DVA) are oscillatory elements used to mitigate the vibration of a primary system subjected to harmonic excitation. The positioning of Stockbridge (DVA for overhead transmission lines) plays an important role in mitigating oscillations of transmission lines caused by airflows. Nowadays, the positioning is defined by technical standards or commercial software. The aim of this paper is to conduct an analysis of multiple DVAs performances in cable conductors of overhead transmission lines. The cable is analyzed by a finite element method and the model is calibrated by experimental results. DVAs performance is analyzed by evaluating total cable energy, and a study of multiple DVAs positioning is conducted. The results are compared to the existing regulations showing situations where proper positioning, different from the standard, can lead to better performance of the DVA. Results also show situations where the use of multiple DVAs is appropriate.

Keywords : dynamical vibration absorber, finite element method, overhead transmission lines, structural dynamics

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