Tuned resonant mass or inerter-based absorbers: unified calibration with quasi-dynamic flexibility and inertia correction - DTU Orbit (08/11/2017)

Tuned resonant mass or inerter-based absorbers: unified calibration with quasi-dynamic flexibility and inertia correction

A common format is developed for a mass and an inerter-based resonant vibration absorber device, operating on the absolute motion and the relative motion at the location of the device, respectively. When using a resonant absorber a specific mode is targeted, but in the calibration of the device it may be important to include the effect of other non-resonant modes. The classic concept of a quasi-static correction term is here generalized to a quasi-dynamic correction with a background inertia term as well as a flexibility term. An explicit design procedure is developed, in which the background effects are included via a flexibility and an inertia coefficient, accounting for the effect of the non-resonant modes. The design procedure starts from a selected level of dynamic amplification and then determines the device parameters for an equivalent dynamic system, in which the background flexibility and inertia effects are introduced subsequently. The inclusion of background effect of the non-resonant modes leads to larger mass, stiffness and damping parameter of the device. Examples illustrate the relation between resonant absorbers based on a tuned mass or a tuned inerter element, and demonstrate the ability to attain balanced calibration of resonant absorbers also for higher modes.

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