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Reduction of Radiated Sound from a Continuum using Low-Damping Vibration Absorbers

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When reducing the sound radiated from a resonant structure, it is necessary to ensure that the driving frequency does not correspond to any of the system resonance frequencies. In addition, it may be desirable to use dynamic vibration absorbers to reduce the response at the driving frequency. In this paper, a low-damping vibration absorber is studied for solving noise radiation problems from a resonant, light-gauge structure driven by a force whose frequency and amplitude are constant and whose frequency does not match any of the system natural frequencies. When the driving frequency and the structure's natural frequency are different, the structure cannot be represented by as a SDOF system. Therefore, the conventional design method, based on equivalent mass, is inapplicable. In this paper, a design method based on the mobility of the structure is proposed. By means of the proposed method, the sound power radiated from a simply supported beam with an attached absorber is calculated and it leads to the following results: 1) When the absorber is installed at the driving point, it reduces the sound power as predicted; 2) An increase in radiated noise may occur when the absorber is not installed at the driving point.