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Some Issues in Active Vibration Control of Smart Structures

Andre Preumont

Active Structures Laboratory, Brussels, Belgium

The paper is divided into three parts. The first one is devoted to the active damping of structures with collocated actuator/sensor pairs, with a particular attention to performance prediction, stability and robustness. A few examples are described, related to space, precision engineering and civil engineering projects. The second part is concerned with vibration isolation; various implementations of the celebrated sky-hook single-axis isolator are discussed and compared; a particular attention is given to the case where the isolator is attached to a very flexible structure. Next, a six-axis isolator based on the architecture of a cubic Stewart platform is discussed in the context of space applications; the close relation between performance and technology is emphasized. The third part is devoted to the spatial filtering with discrete sensor arrays and distributed piezoelectric films. The paper discusses how discrete arrays can be programmed to provide modal filtering or frequency shaping of frequency response functions; the limitations due to spatial aliasing are also described. Finally, a porous electrode design is described, which allows to tailor the equivalent piezoelectric properties of piezo films to achieve a wide class of distributed filters.

View the extended summary