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A Wireless Feedback Control System as a Base of Bio-Inspired Structure System to Mitigate Vibration in Structures

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Abstract : This paper attempts to develop a wireless feedback control system as a primary step eventually toward a bio-inspired structure system where inanimate structure behaves like a life form autonomously. It is a standalone wireless control system which is supposed to measure externally caused structural responses, analyze structural state from acquired data, and take its own action on the basis of the analysis with an embedded logic. For an experimental examination of its effectiveness, we applied it on a model of two-span bridge and performed a wireless control test. Experimental tests have been conducted for comparison on both the wireless and the wired system under the conditions of Un-control, Passive-off, Passive-on, and Lyapunov control algorithm. By proving the congruence of the test result of the wireless feedback control system with the wired control system, its control performance was proven to be effective. Besides, it was found to be economical in energy consumption and also autonomous by means of a command algorithm embedded into it, which proves its basic capacity as a bio-inspired system.

Keywords : structural vibration control, wireless system, MR damper, feedback control, embedded system
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