Different Control of the Semi-Active Vibration Absorber

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The semi-active DVA uses control to adjust the device configuration based on the actual structure of the vibration. As is typical for structural control, there are many types of devices and management laws, some of them are more realistic than others of varying degrees of complexity [1,2]. A considerable number of practical implementations of semi-active DVA's can be found in the literature, some of which are described in details. A more detailed description of the control algorithms are described in [3], by dividing them into two groups. Some of them are based on strategies that constantly change the parameters of the DVA in dynamic mode, and the other - on the ON / OFF control strategy. The latter option, though not as impressive as the first one, tends to result in algorithms that are simpler, more realistic, and easier to implement.

There is a wide application for optimization found algorithms of random search, namely genetic algorithms (GA). The issue in solving this kind of problems is the directing the computer sciences, termed as Artificial Intelligence. For application of GA mathematical models should adequately reproduce the exact dynamic processes in machines and structures with DVA. The following basic requirements must be met:

1. Adequate reproduction of dynamic processes in structures.
2. To include in the set of calculation parameters the determining design and technological parameters.
3. To be adapted to the next transformation into machine codes (there is somewhat absurd idea that designs should be designed not only on the basis of their functional characteristics, but also on the requirements of their maximum simplification, from the conditions of their simplest mathematical modeling).
4. Interact with known software application packages of computer design and computer-based production training.

5. Have an information correlation with world-wide patent knowledge bases (for example, from espacenet.com) and with accessible "open" software on the Internet.

In our optimization method we use genetic methods that give a sequence of points of parameters that coincide with the optimal value. The criterion of robustness is the convexity of these maps in the vicinity of the optimum. We shall also investigate the efficiency of different control rules in the classical case in the vicinity of the resonance. Just like outside the resonance zone, the ON-OFF control is effective only (Fig. 1). Other management is just a bit better than an uncontrollable process.

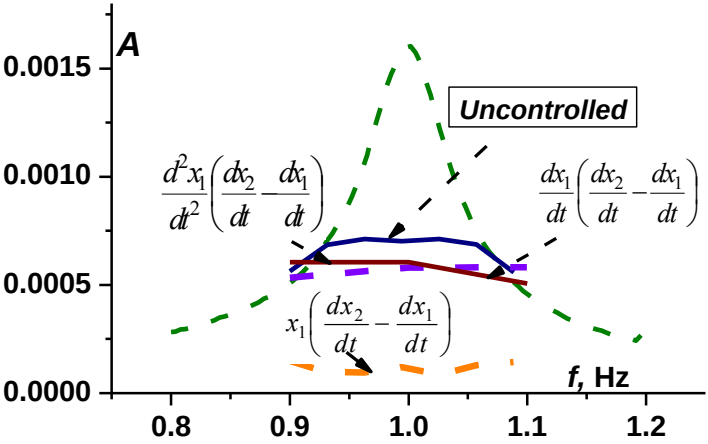

Fig. 1. The efficiency of different control rules in the vicinity of the resonance.

Various types of DVA control: skyhook (different types), ON-OFF, are investigated. It has been found that ON-OFF control is effective only when relative speed measurement of the DVA and of the displacement of the basic design is performed (Fig. 1).

REFERENCES

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