Nonlinear Model Predictive Control Strategies For Electromagnetic Transducers With A Tuned Variable Inerter

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Various kinds of devices employing inerter technologies have been proposed for the purposes of structural control and energy harvesting. Especially, in recent years, considerable efforts have been made to develop variable inerter mechanisms to improve the performance; however, effective algorithms to control the variable inerter mechanism in real time have not been proposed so far. In this paper, the nonlinear model predictive control (MPC) algorithm is applied to the tuned inertial electromagnetic transducer (TIMET), one of the inerter devices taking advantage of the resonance effect proposed by the authors, to control the variable inerter mechanism in addition to the motor. Numerical simulation studies of the TIMET installed on a single-of-freedom model are carried out, and the obtained results show that the nonlinear MPC can be applicable for inerter devices in real time and has a great potential to improve the performance of structural control of variable inerter devices.