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ROZPRAWA DOKTORSKA

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**„Aktywne sterowanie drganiami
mechatronicznego układu napędowego”**

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Abstract

Active vibration control in mechatronic drive system

In this PhD thesis modeling and active vibration control of mechatronic drive system was considered. The main aim of thesis was to develop algorithms for active vibration control of mechatronic system using an electric motor which drives that system. Methodology of modeling of the mechatronic system was described, including identification of physical parameters and simplifying assumptions. The main aim of control was to minimize the swing angle amplitude about a vertical axis during the transportation of load in gantry crane. Control system was build and developed using fuzzy logic. Also the dynamic optimization using genetic algorithm was performed to find the optimal variables of fuzzy logic controler. To verify the model performed experimental tests on the lab-scale industrial gantry crane system connected to PC computer, that was operated in real-time.

It was found that results obtained in numerical simulation were comparable with the results gathered in experimental tests. Application of fuzzy logic enabled a significant reduction in swing vibration amplitude with effective position control. Proposed control method is also robust to parameter variations of mechatronic system.