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Editorial: Active noise and vibration control–Part II

Active Noise and Vibration Control (ANVC) are related techniques concerned with control (cancellation, attenuation or modification) of unwanted noise in the specified elastic-domain (air, water or solid flexible structure) using electro-mechanical devices. The idea of active control of noise was originated in the 1930s. However, recent research results in the fields of digital signal processing, control theory, system identification and development of digital signal processing hardware have made ANVC a truly practical tool. Now ANVC is a modern technology characterized by its high-technology components and increasing number of applications in many areas of scientific and engineering activities. The goal of this Special Issue of Archives of Control Sciences devoted to ANVC is to present some recent developments in this rapidly progressing research and application areas. The presented papers do not cover all topics that are currently being investigated by research groups throughout the world. The focus on fundamental and applied problems connected with application of control sciences in ANVC is given.

The Special Issue of Archives of Control Sciences on Active Noise and Vibration Control contains 17 papers: 1 survey, 5 devoted to active noise control and 11 devoted to active vibration control. The papers are divided into two volumes. Volume I, contains 8 papers, and appears as no. 2 of vol. 11 of the Archives of Control Sciences.

The contributions included in this second volume are all devoted to active vibration control. They are extended versions of selected papers presented at the 6th Conference on Active Noise and Vibration Control Methods held in Cracow, Poland, in May 2003.

The second volume starts with the paper of Banks and Tomas-Rodriguez presenting a new approach to highly nonlinear nonquadratic optimisation problems in which nonquadratic optimization problem is replaced by a sequence of linear, time-varying quadratic problems that may be solved classically. This general method is adapted to optimal control of nonlinear vibrating systems. In the paper of Mitkowski and Skruch control of a slowly rotating Timoschenko beam is considered. Modelling of active vibration isolation systems using electropneumatic servodrives is a topic of the next paper coauthored by Korzeniowski, Kowal and Pluta. In the paper of Ehmann and Nordman the problem of actuator and sensor-placement as well as influence of this placement on feedback control of a flexible structure (gantry milling machine) is discussed. The paper of Koruba and Krzysztofik presents an algorithm for optimal correction of errors for a static gyroscope located on the board of homing missile. The impact of rocket vibrations is minimized. The study of Przybyłowicz addresses the problem of active reduction of resonant vibration in rotating shafts made of piezoelectric composites using proportional and velocity feedback. An autonomous control system for a vehicle driver's seat having suspension equipped with linear magnetorheological fluid damper is presented in the paper of Sapiński. In the next paper Sibielak presents an example of fuzzy controller synthesis for a vibroisolation system taking into account constraints on control system amplitude. The paper of Gosiewski and Sochacki presents a vibration control system for a cantilever beam. In this system piezoelectric elements are used as sensor and actuator.

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Guest Editors

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