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Control in Turkey: Recent advances in research and applications

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This special issue aims to provide an update of the most recent advances in control theory and applications in Turkey. It contains seven previously unpublished papers selected out of more than 250 papers submitted to TOK'2015, which is the 17th TOK meeting organized by Pamukkale University in Denizli, Turkey, on 10–12 September 2015. The Turkish National Committee of Automatic Control (TOK) is the National Member Organization (NMO) of IFAC in Turkey. Annually organized since 1994, the TOK meeting is a major national meeting on control theory and applications that aims at bringing together researchers from various universities and industries in Turkey.

In this issue, the first contribution by Yaman et. al. proposes an internal model controller for linear perturbed systems on the basis of H_∞ dynamic output feedback using linear matrix inequality approach for optimization. The proposed method attenuates the effects of model errors and external disturbances having bounded energies on the controlled output. Efficiency and performance of the method have been verified by simulations.

The second paper is by Yuksek et. al., in which they designed a fault tolerant heading control system for 1/3 scale fixed wing vertical take-off and landing unmanned aerial vehicle in order to minimize the negative effects of sensor faults on flight performance and safety. Simulations under faulty sensor scenarios show the effectiveness of the designed system.

Cicek and Dasdemir, in the third paper, propose a cooperative control method for position synchronization of multiple robot manipulators under the conditions of existence of parametric uncertainties and absence of velocity measurements. In the method, a filter-based output control scheme is used to eliminate some shortcomings of model-based observer/controller mechanism, thereby ensuring the semi-global asymptotic synchronization. Feasibility of the method has been demonstrated on five robot manipulators by simulations.

In the fourth paper, Coskun et. al. present a successful implementation of a hybrid control system composed of a vision-based displacement controller and a force controller applied to an electro-active polymer actuator to mimic the scenario of a micro injection process. Experimental results prove that the proposed control strategies are effective enough to guide the actuator to carry out the cell injection process.

The fifth paper, authored by Erol and Iftar, deals with the stabilizing decentralized controller design problem for LTI neutral time-delay systems. A design approach, based on the continuous pole placement algorithm and the decentralized pole assignment algorithm, is proposed. A design example is also presented to demonstrate the performance of the proposed approach.

Kerimoglu et. al., in the sixth paper, focus on a planar, dynamic walking model with active ankle actuation by means of series-elastic actuation. The model tries to capture the basic structure of human walking. The results demonstrated that the Ankle-Actuated Compass Gait model proposed in the paper exhibits locally asymptotically stable limit cycles corresponding to feasible, sustained walking gaits on flat ground.

Lastly, in the seventh paper, Bayrak et. al. combine the classical PID scheme with the sliding mode fuzzy approach in order to achieve a robust control mechanism that forces the uncertain plant to follow the response of the nominal plant. Efficiency of the proposed mechanism has been verified by a set of simulations.

Finally, we would like to express our sincere appreciation to the authors for submitting their original papers, and to the reviewers who spent time reviewing the papers and provided valuable comments to help the review process for this special issue.

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