Keynote speech info for ICMIMT2022

Short bio

Professor Makoto Iwasaki, Dr. Eng., IEEE Fellow

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Makoto Iwasaki received the B.S., M.S., and Dr. Eng. degrees in electrical and computer engineering from Nagoya Institute of Technology, Nagoya, Japan, in 1986, 1988, and 1991, respectively. He is currently a Professor at the Department of Electrical and Mechanical Engineering, Nagoya Institute of Technology.

As professional contributions of the IEEE, he has participated in various organizing services, such as, a Co-Editors-in-Chief for IEEE Transactions on Industrial Electronics since 2016, a Vice President for Planning and Development in term of 2018 to 2021, etc. He is IEEE fellow class 2015 for "contributions to fast and precise positioning in motion controller design".

He has received many academic, foundation, and government awards, like the Best Paper and Technical Awards of IEE Japan, the Nagamori Award, the Ichimura Prize, and the Commendation for Science and Technology by the Japanese Minister of Education, respectively. He is also a fellow of IEE Japan, and a member of Science Council of Japan.

His current research interests are the applications of control theories to linear/nonlinear modeling and precision positioning, through various collaborative research activities with industries.

Title of the speech

“High Trajectory Tracking of Multi-Axis Robot by Iterative Learning Control”

Abstract of the speech

Fast-response and high-precision motion control is one of indispensable techniques in a wide variety of high performance mechatronic systems including micro and/or nano-scale motion, such as data storage devices, machine tools, manufacturing tools for electronics components, and industrial robots, from the standpoints of high productivity, high quality of products, and total cost reduction. In those applications, the required specifications in the motion performance, e.g. response/settling time, trajectory/settling accuracy, etc., should be sufficiently achieved. In addition, the robustness against disturbances and/or uncertainties, the mechanical

vibration suppression, and the adaptation capability against variations in mechanisms should be essential properties to be provided in the performance.

The keynote speech presents an improvement approach of trajectory tracking performance of multi-axis robot manipulator, where an iterative learning control framework is especially applied as one of practical and/or promising approaches to improve the robot motion performance. Actual issues and relevant solutions for the robot trajectory control performance are clarified and, then, a practical controller design for the iterative learning approach, including the stability analyses, is presented to improve the trajectory tracking performance. In this speech, the effectiveness of the proposed controller design is discussing for an actual multi-axis robot manipulator, comparing to the conventional tracking control approaches.