Prof. Akira MURAKAMI
Dean and Professor, Graduate School of Agriculture, Kyoto University
ISSMGE TC103 (Title: Numerical Methods in Geomechanics), Chair
Former President of Japanese Geotechnical Society (JGS) (2017-2018)
Former Editor-in-Chief, Soils and Foundations (2011-2015)
Current President of Japanese Society of Irrigation, Drainage and Rural Engineering (JSIDRE) (2019-2020)
Member, The Engineering Academy of Japan, The Agricultural Academy of Japan
Editorial Board of Soils and Foundations, Int. J. Geomechanics, Computers and Geotechnics

Prof. Akira Murakami received his BS (1978) from the Agricultural Engineering Department; MS (1980) in the Civil Engineering Department and Dr. Agr. (1991) from Kyoto University (KU), respectively. In 1982, he became an assistant professor in the Agricultural Engineering Department of KU, and was promoted to an associate professor at KU in 1994. He moved to the Graduate School of Environmental Science of Okayama University with a promotion to full professor in 1999. After 10 years at Okayama University, he moved back to a full professor position at KU in 2009 and has been Dean of the Graduate School of Agriculture since 2019. He was the Secretary of ISSMGE TC34 entitled 'Prediction and Simulation Methods in Geomechanics' for eight years (2001-2009) and delivered the General Report entitled 'Analysis' at 16ICSMGE (2005), co-organized the 14th IACMAG Conference (2014) and the IS-Kyoto Conference entitled 'Prediction and Simulation Methods for Geohazard Mitigation' (2009).

His research interests fall within the field of numerical methods in geomechanics, mirroring the title of ISSMGE TC 103, which he chairs. He has published numerous papers in reputable journals, with particular focus on data assimilation, inverse problems, finite element methods, mesh-free methods and DEM. He was awarded the Japanese Society of Civil Engineering (JSCE) Paper Award (1996), the JSIDRE Sawada Prize (2007), the JGS Best Accomplishment Award (2008), the JSIDRE Best Paper Award (2010) and the JGS Best Paper Awards (2011, 2013, 2016, 2019). He also received accolades from IACMAG, e.g., Excellent Contributions Award (2011) and Recognition and Appreciation Award for Organization of 14 IACMAG (2014).

Since completing his dissertation in 1983, he has worked on applications of Kalman filtering in conjunction with FEM (Kalman filter-FEM) to inverse problems in geomechanics. Kalman filtering has numerous advantages over other numerical inversion techniques, in particular the ability to include a regularization term for overcoming ill-posedness in inverse problems and to consider time updating for unknown variables. Entering the 21st century, Kalman filter-FEM has been enhanced by the use of nonlinear Kalman filters, i.e., ensemble Kalman filters and particle filters. Nonlinear Kalman filtering with a numerical discretization scheme has been called 'data assimilation' in various fields, such as Meteorology, and numerical weather forecasting is the most wide-spread

example in practical use. Prof. Murakami has introduced data assimilation using particle filtering instead of linear Kalman filters with FEM into geotechnical practice, especially with application to numerical forecasting of settlements over long periods considering measurements during the construction sequence. Such techniques are utilized in actual construction practice, for example the settlement management after construction of Kobe Airport, the observational method for excavation works and construction of a high rock-fill dam, and a deep railway tunnel for the JR Maglev line.

Prof. Murakami and his group have also developed other prediction and simulation methods; 1) sophisticated FEM for solving specific problems, e.g., element-free Galerkin method for soil-water coupled problems to deal with large deformation for localization and its stabilization scheme, and space-time FEM for structure or soil dynamics to improve numerical accuracy compared with existing time integration schemes, 2) particular type of DEM to consider the shape effect of the blocks comprising a dry-stone masonry retaining wall under seismic loading through centrifuge model tests and numerical simulations using three-dimensional DEM. This technique has been adopted for the examination of earthquake resistance of actual masonry construction in the Tokyo Imperial Palace and used for assessment of repairs of damage sustained by Kumamoto castle during a strong earthquake in 2016.