Preface to the special issue on data science in dynamics and control

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The data science and artificial intelligence have experienced rapid development in recent years and have led to new technological innovations in various disciplines. With the advent of communication and sensor technologies, it is quite convenient to measure input–output data of engineering systems operated in complex environment. As more and more data become available, the concepts and methods of data science have begun to transform the engineering research, in particular, the research of dynamics and control. This special issue on Data Science in Dynamics and Control presents a collection of articles reporting recent advances on this emerging topic.

Two survey articles are published in this issue, which cover a wide range of data-driven research on solid mechanics, structures and dynamics, and the integration of data with control design. The research work of the articles in the special issue covers a broad spectrum of applications of data science to dynamics and control problems. An interesting study is

on deep learning-based cross-sensor domain adaptation for fault diagnosis. Another work presents a generic algorithm for automatic selection of neural network models. Several articles present studies of data-driven and machine learning approaches to cyclic hardening polycrystalline metals, nonlinear dynamical systems with chaotic itinerancy, transonic flutter boundary, vehicle differential braking control, solution to partial differential equations governing the probability density function of stochastic systems, and electron dynamics. The concepts from data science have also started transforming conventional methods for analysis of nonlinear dynamic systems. Two articles report the recent studies of global analysis of north Pacific Ocean and an improved subdivision technique of the cell mapping method.

We hope that the articles published in the special issue will draw more attention from the scholars around the world to this exciting and emerging research field.

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