LSGI Distinguished Lecture Series

Date: 4 July 2018 (Wed)
Time: 4:00pm - 5:00pm
Venue: ZN604
Language: English

Dr Peiliang Xu
Disaster Prevention Research Institute
Kyoto University

Biography

Dr Xu obtained his PhD in geodesy from Wuhan University in 1989. After a number of years of doing research at Delft University of Technology, The Netherlands, Stuttgart University, Germany, The University of Calgary, Canada, and The National Research Institute of Earth Sciences and Disaster Prevention, Japan, he joined the Disaster Prevention Research Institute in 1997.

He has been working on linear and nonlinear inverse problem theory, random(stress/strain) tensors, global positioning systems (GPS) for very high precision positioning, deformation measurement analysis, mathematical and physical geodesy. More than 40 papers have been published in a number of journals, covering all of these subjects. A number of invited lectures/ talks/ seminars have been given at several universities and research institutions in Europe and Asia. His research interest also includes earthquake statistics, theoretical seismology, and earthquake dynamical simulations.

Measurement-based perturbation and differential equation parameter estimation: solutions to mathematical problems incorrectly solved for 100 years and mathematical foundations for satellite gravimetry from tracking

Estimating unknown differential equation parameters has been essential in many areas of science and engineering, which has been best known as the dynamical numerical integration method in geodesy and aerospace engineering. The method has been widely used today by almost all major institutions worldwide to produce standard satellite gravity models (NASA Goddard Space Flight Center, JPL, GFZ and Univ Texas Austin CSR, for example). These products have found widest possible multidisciplinary applications in many different areas of science and engineering. Dr Xu proves that the method, originating from Gronwall (1919, Ann Math) almost 100 years ago and currently implemented and used in statistics, chemical engineering and satellite gravimetry and many other areas of science and engineering, is mathematically erroneous and physically not permitted. He presents three different methods to derive local solutions to the Newton's nonlinear differential equations of motion of satellites, given unknown initial values and unknown force parameters. They are mathematically correct and can be used to estimate unknown differential equation parameters, with applications in gravitational modelling from satellite tracking measurements. These solution methods are generally applicable to any differential equations with unknown parameters, which may be commonly encountered in different subject areas of science and engineering; he develops the measurement-based perturbation theory and construct global uniformly convergent solutions to the Newton's nonlinear differential equations of motion of satellites, given unknown initial values and unknown force parameters. From the physical point of view, the global uniform convergence of the solutions implies that they are able to exploit the complete/full advantages of unprecedented high accuracy and continuity of satellite orbits of arbitrary length and thus will automatically guarantee theoretically the production of a high-precision high-resolution global standard gravitational models from satellite tracking measurements of any types; and finally, he develops an alternative method by reformulating the problem of estimating unknown differential equation parameters, or the mixed initial-boundary value problem of satellite gravimetry with unknown initial values and unknown force parameters as a standard condition adjustment model with unknown parameters.

All are WELCOME!

To register, please go to: https://goo.gl/ZE8v9b

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