数学与系统科学研究院学术报告

报告题目：**Autonomous Distributed Control of Next-Generation Smart Grids**

报 告 人：**Qing-Chang Zhong (The University of Sheffield)**

时间地点：**10:45 - 11:45am, Dec. 20, Room 405, Siyuan Building**

摘要：

**Power systems are going through a paradigm change from centralised generation, to distributed generation, and further on to smart grid. A huge number of heterogeneous players, including renewable energy sources, electric vehicles, and storage systems etc. on the supply side and different types of smart loads on the demand side, are being connected to power systems to form smart grids. Because of the heterogeneous nature and the huge number of players involved, it is a great challenge for control and systems theorists to find a control architecture so that all heterogeneous players could work together to maintain system stability and achieve desired performance.**

**In this talk, an autonomous distributed control architecture is presented from the systems perspective for the next-generation smart grids. All the heterogeneous players are made to behave homogeneously, in terms of the underlying mathematical models, by adopting the synchronverter technology that makes power converters behave like synchronous machines to unify the interface of these players with the grid. This architecture facilitates the reduction of large-scale power systems into small-scale models and the analysis of power systems, including stability. All the distributed players (agents) communicate with each other through the dynamics of power systems, instead of an extra communication network, to realize the same goal with independent individual actions. This holistic solution considerably enhances the operability, performance and reliability of next-generation smart grids.**

报告人简介：

**Qing-Chang Zhong received his PhD degree in control theory and engineering from Shanghai Jiao-Tong University in 2000 and his PhD degree in control and power engineering (awarded the Best Doctoral Thesis Prize) from Imperial College London, UK, in 2004. He is the Chair Professor in Control and Systems Engineering at the Department of Automatic Control and Systems Engineering, The University of Sheffield, UK. He is a Specialist recognised by the State Grid Corporation of China (SGCC), a Distinguished Lecturer of IEEE Power Electronics Society (2014-2016), the UK Representative at the European Control Association (EUCA) and the Chair of 2015 IEEE International Future Energy Challenge (Topic B). He made fundamental contributions to the robust control of time-delay systems in the frequency domain and jointly invented the synchronverter technology to control inverters to mimic synchronous generators, which was awarded Highly Commended at the 2009 IET Innovation Awards, and proposed a distributed control architecture for the next-generation smart grids. He is a Fellow of the Institution of Engineering and Technology (IET), a Senior Member of IEEE and was a Senior Research Fellow of the Royal Academy of Engineering/Leverhulme Trust, UK (2009–2010). He serves as an Associate Editor for the Conference Editorial Board of the IEEE Control Systems Society, IEEE Transactions on Power Electronics and IEEE Access. His research focuses on advanced control theory and applications in various sectors, including chemical processes, automotive, renewable energy, smart grids, electric drives and electric vehicles, aircraft power systems, high-speed trains etc.**