**CV – Yusheng Xue**

**Bio Description**

Professor Yusheng Xue received the MSEE degree in 1981 in Electrical Engineering from EPRI, China and the PhD degree in 1987 from the University of Liege, Belgium. He has been an elected academician of the Chinese Academy of Engineering since 1995. He is now the Honorary President of State Grid Electric Power Research Institute (SGEPRI or NARI), China, Adjunct Professor in dozens of universities in China and a conjoint professor of the University of Newcastle in Australia. He is the Editor-in-Chief of Automation of Electric Power System (in Chinese) and that of Journal of Modern Power Systems and Clean Energy (in English), as well as Chairman of the Technical Committee of Chinese National Committee of CIGRE since 2005.

Professor Xue received a National Prize on Science in 1977, a National First Prize of Achievement in the Advance of Science and Technology in 1996, a National Second Prize of Achievement in the Advance of Science and Technology in 2003, a National Second Prize of Invention in 2004, a National Second Prize of Achievement in the Advance of Science and Technology in 2005, and a National Second Prize of Achievement in the Advance of Science and Technology in 2012.

Professor Xue also received a First Prize of the 10th National Excellent Technical Book Prize in 2001 (total 40 winners), a National Prize of Golden Patent in 2006 (total 119 winners from all Chinese patents during 2004-2005) and a National Prize of Excellence Patent in 2012.

He has been an invited speaker at many Universities, Institutions and Conferences around the world. He became a PhD supervisor in 1994. By the end of 2014, 25 Master students, 35 Ph.D students and 4 post-doctor were successfully supervised in the field of power systems or nonlinear dynamics. 18 Ph.D students are being supervised. He has published 8 books and more than 470 technical papers, including 170 international publications.

**Key positions**

* Chief Engineer of State Grid Electric Power research Institute 1994-2008
* Honorary President of State Grid Electric Power research Institute 2009- Current
* Editor in Chief, Automation of Electric Power Systems (in Chinese) 1999- Current
* Editor in Chief, of Journal of Modern Power Systems and Clean Energy (in English) 2013- Current
* Honorary Professor, the University of Queensland, Australia 2007-2010
* Conjoint professor, the University of Newcastle, Australia. 2011-2014

**Expertise and Contributions**

Professor XUE is one of the leading experts in the area of power system stability analysis and control. The Complementary-Cluster Energy-Barrier Criterion (CCEBC) developed by him is a rigorous theory and quantitative method for general motion stability of any non-conservative and non-autonomous systems. CCEBC breaks direct methods' limitations and becomes applicable to any detailed models and complex scenarios and multi–swing stability, while keeping extremely less computational burden. Being quantitative and very informative, CCEBC is able to identify all potentially unstable modes, recognize both dangerous and the safest reloading directions, and offer sensitivity information. The method has the same accuracy and modeling flexibility as the utilized numerical integration. Besides, it is general and fast enough for on-line tracking system changes.

The Extended Equal-Area Criterion (EEAC) for power system stability is just such an example. EEAC method has been proved to furnish a necessary and sufficient condition for stability of multimachine systems, and to be a rigorous direct method. The outstanding performances of EEAC have been demonstrated by on-line operation records in many EMS environments all over the world, and by off-line engineering services of a world-wide commercialized software package.

Professor XUE innovated and extensively applied comprehensive defense techniques against massive blackouts, which has greatly improved the economy and security of Chinese power systems. A Wide-Area Monitoring Analysis Protection-Control system (WARMAP) with full intellectual property rights has been developed and applied to 4/5 of the provincial and national grids. Efforts are underway to achieve higher goals, including extending the range of data collection from the power system to the natural environment, extending the scope of coordinated control from normal grid conditions to extreme environments, upgrading the defense strategies from preplanned measures to active defense. Through these efforts, the Chinese power systems expect to achieve coordinated and optimized comprehensive defense for ensuring the security and stability of bulk power systems and prevent external disasters or accidental fault from progressing to power system blackouts.

**Leadership and International Collaboration**

Professor XUE was the Chief Engineer of State Grid Electric Power research Institute (SGEPRI), also that of NARI Group Corporation (NARI) during 1994-2008; he has been appointed as the Honorary President of SGEPRI/NARI since 2009. SGEPRI/NARI is the largest whole set supplier of electric power equipment in China and an active player in the global power industry. It has over 22,000 engineers and technicians; achieving revenue over US$5.7 billion in 2013. Its 40+ branch companies and subsidiaries covering power system security and stability control, power grid automation, relay protection and power electronics, transmission and transformation equipment, power distribution and consumption management, information and communication technology, renewable energy, water conservancy and hydropower, industrial control etc.. It has established 23 overseas organizations in Europe, Asia, South America and Africa such as Brazil Company and Indonesia Company.

Professor XUE participated several international projects. He assisted EDF France to adopt EEAC software to its system planning in 1994, and collaborated with Powertech Labs. Inc. (PLI) Canada during 1996-1998, to integrate their transient stability software with EEAC and put the new software package TSAT to the world market. He participated ARC DP0559461 “Emergency control for power system separation” led by Professors GF Ledwich and ZY Dong (2005-2008), and an international network planning program “Ensure a reliable operation of a sustainable future system” sponsored by Denmark's science ministry in 2013, and a project of Hong Kong government RGC 5151/10E “Power system security and vulnerability assessment under smart grid initiative” led by Professor ZY Dong (2010-2013), and a project ARC DP120101345 ”Robust electricity networks accommodating high levels of renewables” (2012-2014) led by Prof Gerard Ledwich and Prof ZY Dong. He is now involved in an EPSRC UK project “Control and optimization for Integration of EVs with smart grid”（2013-2016）led by Professor K Li of University Belfast (QUB).

**Selected Grants**

All the following grants were issued at the country level, excluding 30+ grants from provincial governments, State Grid Corporation of China or China Southern Power Grid.

* Y Xue, Stability mechanisms of time-varying nonlinear motional systems, National Natural Science Foundation of China (NSFC) 59577002, 1996-1997.
* Yushu Chen, Y Xue et al., Nonlinear dynamics problems of large rotating machinery, NSFC Key Project 19990510, 1998-2003.
* Y Xue et al., Theory and rapid identification of power system synchronous stability. National High Technology Research and Develop Program (NHTRDP) G19980203, 1998-2003.
* Y Xue, Stability of very large scale power systems, NSFC 59920037, 2000-2001.
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* Y Xue, The global bifurcation and mechanism of high dimensional chaos, NSFC 10272031, 2003.
* Y Xue et al., Reliability interactions between power systems and electricity markets. NHTRDP G19980203, 2004-2009.
* Y Xue et al., Basic theory and key technologies of wide-area security defense framework, NSFC Key Project 50595413, 2005- 2008.
* Y Xue et al., Online decision-supporting and coordinated control for power grid security defense, Ministry of Science and Technology, 2008BAA13B05, 2008-2012.
* Xiangyang Li , Y Xue, et al. Principle and methods for emergency response to unconventional events, NSFC Key Project 91024028, 2011-2013.
* Sulong Ma, Y Xue et al., Key technologies and demonstration of power grid with high penetration of renewable energy generation. National 863 Program 2011AA05A105, 2012-2014.
* Boming Zhang, Y Xue et al., Energy management and operational control for source-grid-load collaboration, NHTRDP 2013CB228204, 2013-2018.

Selected Publications

[1] Y.Xue, Th.Van Cutsem and M. Pavella, ‘A simple direct method for fast transient stability assessment of large power systems’. IEEE Trans. on Power Systems. Vol.PWRS-3 No.2, 1988.

[2] Y.Xue, Th.Van Cutsem and M. Pavella, ‘Extended equal area criterion: justifications, generalizations, applications’. IEEE Trans. on Power Systems, Vol.PWRS-4 No.1, 1989.

[3] Y.Xue and M.Pavella, ‘Extended equal-area criterion: an analytical ultra-fast method for transient stability assessment and preventive control of power systems’. Int. Journal Electrical Power & Energy Systems Vol.11 No.2, 1989.

[4] Y.Xue, L.Wehenkel, R.Belhomme, et al., ‘Extended equal area criterion revisited’. IEEE Trans. on Power Systems. Vol.PWRS-7, No.3, 1992.

[5] Y.Xue and M.Pavella, ‘Critical cluster identification in transient stability studies’. Proc. IEE(UK) Vol.140 Pt.C, 1993.

[6] Y.Xue, ‘Integrated extended equal area criterion’. Invited paper, 5th Symposium of Specialists in Electric Operational and Expansion Planning, Brazil, May 1996.

[7] Y.Xue, T.Xu, B.Liu, Y.Li, ‘Quantitative assessments for transient voltage security’. IEEE Trans. on Power Systems. Vol.PWRS-15 No.3, 2000.

[8] Xue Y. The stability-preserving trajectory-reduction methodology for analyzing nonlinear dynamics. Keynote in International Conferences on Info-tech & Info-net, ICII2001 Beijing, 2001.

[9] Y. Xue, Defense schemes against Power System Blackouts in China with High Load Growth. Invited paper, PSCC-2005 Belgium

[10] Y. Xue, W. Li and D. J. Hill. Optimization of Transient Stability Control. Part-I: For Cases with Identical Unstable Modes. International Journal of Control, Automation, and Systems. 2005, 3(2).

[11] Xue Yusheng．Towards Space-time Cooperative Defense Framework against Blackouts．Paper 07GM 0557, IEEE-PES 2007 General Meeting, Tampa, USA

[12] Y. Xue, "Some viewpoints and experiences on WAMS and WACS," Paper 08GM 0570, IEEE-PES 2008 General Meeting, Pittsburgh, PA ,USA, 2008.

[13] Y. Xue, "Progresses of Blackout Defense Systems in China," Paper 08GM 1002, IEEE-PES 2008 General Meeting, Pittsburgh, PA ,USA, 2008.

[14] J. Huang, Y. Xue, Z. Y. Dong, K. P. Wong. An Efficient Probabilistic Assessment Method for Electricity Market Risk Management, IEEE Trans. on Power Systems, Vol. 27, No.3, August 2012.

[15] Yusheng Xue, Tianran Li, Xia Yin, et al. Managements of Generalized Congestions. IEEE Transactions on Smart Grid. 2013,4(3).

[16] Guanrong Chen, Yusheng Xue. The China Power Grid - its Present and Future from a Network Science Perspective -- An interview - National Science Review, 2014, 1(3)

[17] Wenjie Yu, Yusheng Xue, Jianbo Luo, et al. A UHV Grid Security and Stability Defense System: Considering the Risk of Power System Communication. IEEE PES GM2014, Washington.