CREW Center for Research and Education in Wind

CREW Seminar Series: Spring 2013

Control Strategy to Mitigate the Impact of Reduced Inertia due to Doubly Fed Induction Generators on Large Power Systems

Abstract

This talk is based on developing a control strategy to mitigate the impact of reduced inertia due to significant DFIG penetration in a large power system by designing a supplementary control for the DFIG power converters such that the effective inertia contributed by these wind generators to the system is increased. Results obtained on a large realistic power system indicate that the frequency nadir following a large power impact in the form of generators dropping out is effectively improved with the proposed control strategy. The proposed control is also validated against the sudden wind speed change in the form of wind gust downs and wind ramp downs occurring in conjunction with the generators dropping out. A beneficial impact in terms of damping power system oscillations is also observed, which is validated by eigenvalue analysis. The damping improvement observed in time domain and subsequent Prony analysis support the result obtained from eigenvalue analysis.

By **Prof. Vijay Vittal, Arizona State University**

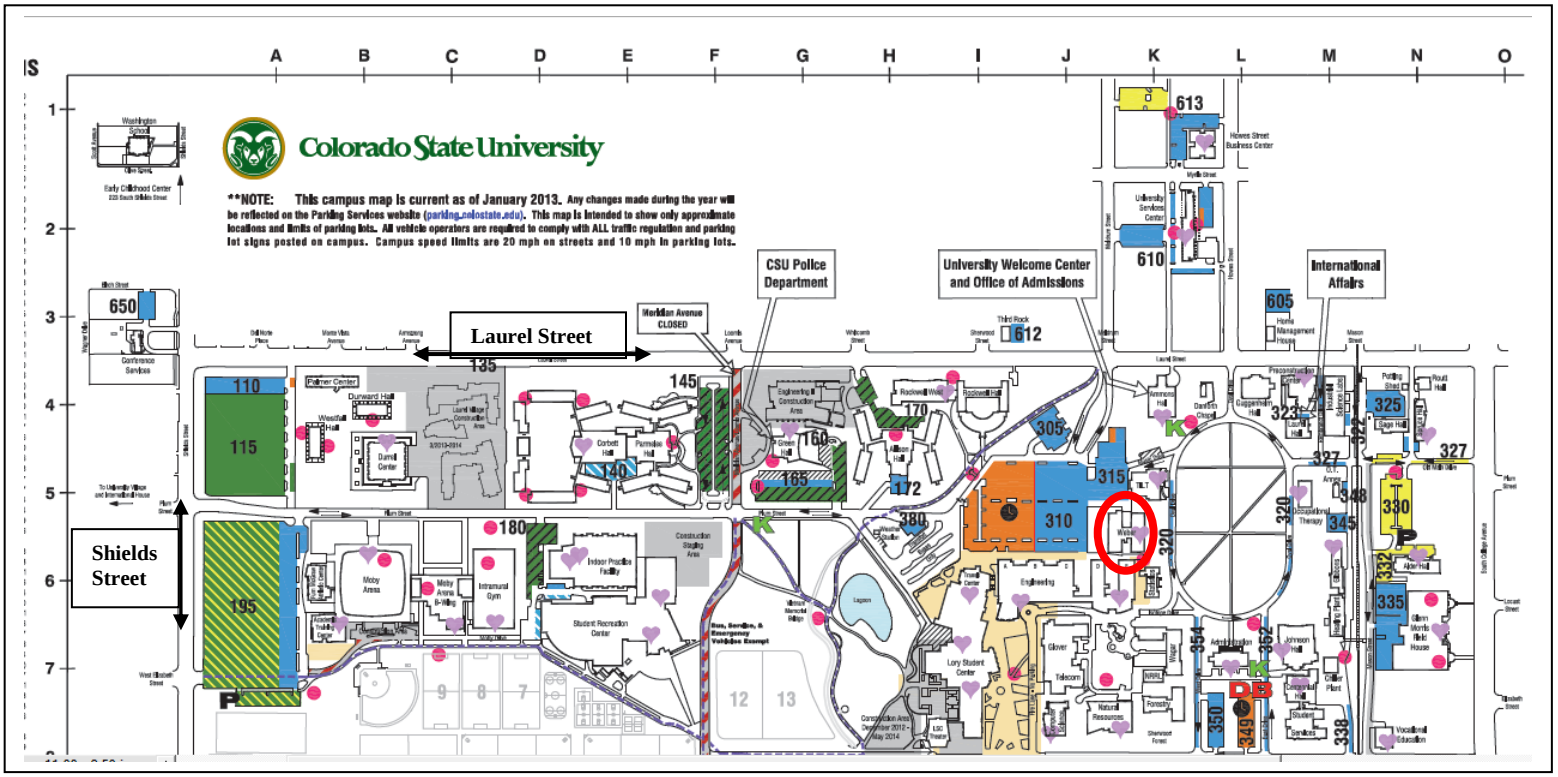
When: **Monday, April 22** at **2:00pm**

Location: **Weber 202, Colorado State University**

Link for simulcast on web: http://tinyurl.com/CREW-SP13-Vittal

Vijay Vittal was born in Bangalore, India. He received the B.E. degree in electrical engineering from the B.M.S. College of Engineering, Bangalore, India, in 1977; the M.Tech. degree in electrical engineering from the Indian Institute of Technology, Kanpur, India, in 1979; and the Ph.D. degree in electrical engineering from Iowa State University, Ames, in 1982. Currently he is the Ira A. Fulton Chair Professor in the Electrical Engineering department at Arizona State University. From 1982 – 2004 he served as a faculty member at Iowa State University. He joined the Faculty of the Department of Electrical & Computer Engineering at Iowa State University in 1982, he was promoted to the rank of associate professor in 1986, and to the rank of professor in 1990. In 1999 he was appointed as the Harpole Endowed Professor and in 2003 became an Anson Marston Distinguished Professor. His research interests are in the area of power system dynamics, dynamic security assessment of power systems, power system operation and control, and application of robust control techniques to power systems. He is the author and co-author of several papers in his field. In 1992 he co-authored the textbook entitled Power System Transient Stability Assessment Using the Transient Energy Function Method with A. A. Fouad, in 1999 he co-authored the textbook entitled Power System Analysis with A. R. Bergen, and in 2012 he coauthored the textbook entitled Grid Integration and Dynamic Impact of Wind Energy with Raja Ayyanar. During 1993-1994 he was the Program Director of the Power Systems Program at the U. S. National Science Foundation. He is a recipient of the 1985 Presidential Young Investigator Award. In 1988, he received the NCR Faculty Award of Excellence. He also received the 1989 Iowa State University College of Engineering "Young Engineering Faculty Research Award." In 1997, he was elected as a Fellow of IEEE for contributions "to the development of the transient energy function method and its application to power system dynamic security assessment, and for leadership in power engineering education and research." He was also the recipient of the 2000 IEEE Power Engineering Society Outstanding Power Engineering Educator Award. From 1998-2000 he was the Chairman of the IEEE Power Engineering Society System Dynamic Performance Committee. He was the technical program chair for the 2001 IEEE PES Summer Power Meeting. In 2003 he received Iowa State University Foundation Award for Outstanding Achievement in Research and was also elected to the U.S. National Academy of Engineering in 2004. From 2005-2011 he served as the Editor in Chief of the IEEE Transactions on Power Systems. In 2013 he was awarded the IEEE Herman Halperin T&D Field Award. Since 2005 Dr. Vittal has also served as the Director of the Power System Engineering Research Center, a Phase III National Science Foundation, Industry/University Collaborative Research Center consisting of 13 member universities and 40 industry members.

The Weber building is pictured just west of the oval, left of #320, section K-6, and is circled in **red** in the map below.
Parking lots: blue lots are for "A" parking permits.



Note: This seminar is co-sponsored by the Colorado State University Information Science and Technology Center (ISTeC). ISTeC (Information Science and Technology Center) is a university-wide organization for promoting, facilitating, and enhancing CSU's research, education, and outreach activities pertaining to the design and innovative application of computer, communication, and information systems. For more information please see ISTeC.ColoState.edu

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