

Electric Springs – A Smart Grid Technology for Taming the Intermittent Nature of Wind and Solar Power

Chi-Kwan LEE

Assistant Professor,

Department of Electrical and Electronic Engineering, The University of Hong Kong

Keywords: *Distributed power systems, smart loads, stability*

Abstract

The intermittent nature of wind and solar power has been identified as a de-stabilizing force to the power grid. It is envisaged that more stability issues will evolve as the amount of renewable power generation increases. With more distributed power generation, the control paradigm has to be changed so that ‘the load demand will follow the power generation’, in contrast to existing control paradigm that ‘the power generation follows the load demand’. Based on power electronics technology, Electric Spring is a new distributed technology that can (1) tame the intermittent nature of wind and solar power and (2) ensure ‘the load demand to follow the power generation’. Electric springs are power electronic circuits that act as ‘active suspension’ systems. When distributed over the distribution networks, they provide a robust stability support system for future power grid. The Electric Spring concept can be incorporated easily either (1) into non-critical electric appliances, (2) as part of the power supply infrastructure or (3) into grid-connected wind/solar power inverters.