Flow Control for Power Systems with Intermittent Renewable Energy (2012-111)

Dynamic Stochastic Optimal Power Flow (DSOPF) control for power systems with intermittent renewable energy generation

Market Overview

This technology is aimed at better integration and control of renewable power sources into conventional power utilities. With growing concerns over environmental impact of coal and gas power, there is an ever-increasing rise of wind, solar, and geothermal energy generation being brought online. It is expected that by 2023 that about 12% of the total global energy supply will be from renewable energy sources. By 2025 this market is expected to be valued at $1.49 trillion. This technology would help facilitate the increase of these new sources by controlling their unpredictability and managing the high short-term variability associated with intermittent energy sources.

Technical Summary

This technology integrates aspects such as power system economy, stability and security into the formulation of the DSOPF methodology to help achieve the goal of non-linear optimal control. This proposed DSOPF system can replace other methods such as adaptive critic designs and secondary voltage control to help ensure that a coordinated alternating current power flow is created. Therefore, highly variable energy systems, such as those associated with renewable energy sources, can be continuously maintained at optimal operating status through adjustment of set points within established algorithms.

Application

Renewable Energy/Power Systems Control

Development Stage

Optimized technology ready for licensing

Advantages

- Provides regulation and optimization for both active and reactive power
- Enables addition of renewable energy sources without need for updgrading line capacities
- Accounts for high short-term variability and uncertainty associated with intermittent energy sources

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Utility	United States	13,859,242	US 9,507,367	2012-111	Dr. Kumar Venayagamoorthy

About the Inventors

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Dr. Kumar Venayagamoorthy is the Duke Energy Distinguished Professor within the Department of Electrical and Computer Engineering at Clemson University. He earned his Ph.D. in Electrical Engineering at the University of Natal in South Africa. Prior to joining Clemson University, Dr. Venayagamoorthy has been on academic staff at the Durban Institute of Technology, and research appointments and Texas Tech, University of Missouri-Rolla, and ABB Corporate Research Center. Additionally, he is the Founder and Director of the Real-Time Power and Intelligent Systems Laboratory, a fellow of the IET, senior member of the IEEE, and a member of Board of Governors of INNS. His research has focused on the development and implementation of advanced computational methods for smart grid applications and his recent interests had been in the development of synchrophasor applications, and intelligence systems for the electrical power system.

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