عنوان مقاله:

Supervisory Controller Design for Power System Stability using Hybrid Automata Modeling

محل انتشار:

مجله الکترونیک صنعتی ،کنترل و بهینه سازی, دوره 4, شماره 4 (سال: 1400)

تعداد صفحات اصل مقاله: 16

نویسندگان:

Fariba Forouzesh - *Department of Electrical Engineering, Kerman Branch, Islamic Azad University, Kerman, Iran*

Mahdiyeh Eslami - *Department of Electrical Engineering, Kerman Branch, Islamic Azad University, Kerman, Iran*

Mehdi Jafari Shahbazzadeh - *Department of Electrical Engineering, Kerman Branch, Islamic Azad University, Kerman, Iran*

خلاصه مقاله:

Power systems are categorized as nonlinear dynamical systems, and the importance and complexity associated with their stability have dramatically increased. Accordingly, the behavior of power systems can be characterized by interactions between continuous and discrete-event dynamics. This paper proposes a systematic approach to the design and analysis of a supervisory control scheme for power systems using the hybrid automata (HA) model. The proposed model for optimal controller application is derived, and the power system's overall behavior is modeled using HA to enhance its stability. Hybrid systems' formulation incorporates continuous dynamics as well as discrete switching behavior into a modeling and control framework, thus allowing a complete system description while crystallizing the concepts of safety into system design criteria. This study uses a power system HA model as a discrete event system (DES) plant and controller. In the proposed method, to present the hybrid model, the discrete events used include the presence and absence of disturbances and voltage control elements, fault, sudden load increase, capacitor bank, and under-load tap changer (ULTC) transformer. Voltage stability and control are investigated by the generators' rotor angle, bus voltage, eigenvalues, and the stability theory of the switched linear systems. Applications in voltage control, stability, and dynamic service restoration are presented on two benchmark power systems with ۱۲ discrete states. The simulation results reveal the effective performance of the proposed supervisory controller model to enhance voltage stability in power systems.

کلمات کلیدی:
Discrete Event, Hybrid Automata (HA), Modeling, Voltage Stability

لینک ثابت مقاله در پایگاه سیویلیکا:

https://civilica.com/doc/1480066