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(54) **OPTIMAL POWER FLOW-BASED  
HIERARCHICAL CONTROL METHOD FOR  
DISTRIBUTED ENERGY STORAGE SYSTEM  
(ESS)**

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(57) **ABSTRACT**

Disclosed is an optimal power flow-based hierarchical control method for a distributed energy storage system (ESS), where the method divides control of an energy storage cluster into three layers, performs primary and secondary control to realize intra-cluster control, and performs tertiary control to realize inter-cluster control. In the primary control, droop coefficients are set to realize intra-cluster basic power distribution. In the secondary control, a frequency/voltage shift and uneven power distribution that are caused by a droop are compensated for based on a consistency algorithm. In the tertiary control, a central controller is set, a solution of an optimal power flow is calculated and delivered to each cluster as a control signal, and the control signal is tracked in real time through the secondary control and the primary control. The method adjusts a reference voltage of each energy storage cluster without requiring a common bus.

(71) Applicant: **State Grid Hubei Electric Power  
Research Institute, Wuhan, Hubei  
(CN)**

(72) Inventors: **Defu Cai, Wuhan, Hubei (CN);  
Kunpeng Zhou, Wuhan, Hubei (CN);  
Zuowei Wang, Wuhan, Hubei (CN);  
Xiaohui Li, Wuhan, Hubei (CN); Li  
Wan, Wuhan, Hubei (CN); Haiguang  
Liu, Wuhan, Hubei (CN); Rusi Chen,  
Wuhan, Hubei (CN); Wenna Wang,  
Wuhan, Hubei (CN); Tao Wang,  
Wuhan, Hubei (CN); Liangyi Zhang,  
Wuhan, Hubei (CN); Guanqun Sun,  
Wuhan, Hubei (CN); Erxi Wang,  
Wuhan, Hubei (CN)**

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