Pumped storage unit parameter settings

What is variable-speed pumped storage (VSPs)?
When the unit speed deviates from the optimal speed, the efficiency of the turbine will reduce, resulting in deterioration of unit operation. Therefore, in order to improve the unit operation condition, variable-speed pumped storage (VSPS) should be employed.

Why are pumped storage units important?
Pumped storage units play an important role in the peak load shifting and primary frequency regulation of a power grid,Moreover,these units are crucial for the safe and stable operation of power grids [1].

How do pumped storage units work?
Conventional pumped storage units using the synchronous motor,the speed controlled by the governor and guide vane opening. By adjusting the guide vane opening and excitation voltage can adjust the active and reactive powers. As the unit is a synchronous motor,the motor speed is constant,running at the synchronous speed.

Which control system controls the opening of a pumped storage unit?
In the pump mode,the variable speed control systemof pump-turbine controls the opening of the unit Y according to the optimal opening Yopt obtained according to the values of Pref and H. The RSC system controls P,Q,and ?r according to the values of Pref,Qref,and ?opt. Control strategy of a doubly-fed pumped storage unit

What are the characteristics of a doubly-fed pumped storage unit?
A doubly-fed pumped storage unit was connected to an infinite power grid. The rated power of the unit is 306.1 MW,its rated head is 425 m,and its rated speed is 428.6 r/min. The characteristic parameters of the pump and turbine system are presented in Table 1,and the characteristic parameters of the DFIG are presented in Table 2.

What is the power turbulence of a pumped storage unit?
At the beginning of the simulation for 10%power turbulence,the power of the doubly-fed pumped storage unit was - 0.8 pu,the head was 1.0 pu,the rotational speed was 0.945 pu,and the efficiency of the generator was 96%. At 70 s,the power of the unit had changed from - 0.8 to - 0.7 pu.

In pump mode, variable-speed pumped storage units (VSPSUs) have wider power regulation ranges and more flexible power responses than fixed-speed pumped storage units (FSPSUs); however, the ...

The diagnosis of vibration signals of pumped storage units is crucial to the safe and stable operation of the units. In this paper, a fault diagnosis method with high recognition ...

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The model of doubly fed pumped storage unit of 300 MW is established in MATLAB/Simulink and the simulations are presented to verify the proposed control strategy. The parameters of DFIG in simulation are shown in ...

Currently, the new power system is evolving from the traditional "generation-network-load" triad to a four-element system of "generation-network-load-storage", and energy storage has gradually ...

: Parameter identification is an important method to establish the governing system of a pumped storage unit. Appropriate parameters will make the governing system obtain better control ...

The role of pumped storage in global energy structure transformation is becoming increasingly prominent. This article introduces a flexible excitation system based on fully ...

Variable-speed pumped-storage unit (VSPSU) has become a state-of-the-art technology in pumped-storage industry. It has advantages in rapidity, flexibility, efficiency, and ...

The PSS parameter setting under different conditions is related to the safe and stable operation of the power system. This paper first analyzes the excitation operation mode of the pumped ...

A nonlinear hierarchical general predictive governing control scheme for pumped storage units. Author links open overlay panel Xuan Zhou a, Yang Zheng a, Tingyuan Xu a, Bo Xu b, ... The ...

With escalating concerns about climate change, the search for a clean, reliable and efficient energy solution is becoming a challenging task [1]. Pumped storage plant (PSP) ...