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Hardware-in-the-Loop Test for Automatic Voltage Regulator of Synchronous Condenser

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Abstract : Automatic voltage regulator (AVR) plays an important role in volt/var control of synchronous condenser (SC) in power systems. Test AVR performance in steady-state and dynamic conditions in real grid is expensive, low efficiency, and hard to achieve. To address this issue, we implement hardware-in-the-loop (HiL) test for the AVR of SC to test the steady-state and dynamic performances of AVR in different operating conditions. Startup procedure of the system and voltage set point changes are studied to evaluate the AVR hardware response. Overexcitation, underexcitation, and AVR set point loss are tested to compare the performance of SC with the AVR hardware and that of simulation. The comparative results demonstrate how AVR will work in a real system. The results show HiL test is an effective approach for testing devices before deployment and is able to parameterize the controller with lower cost, higher efficiency, and more flexibility.

Keywords : automatic voltage regulator, hardware-in-the-loop, synchronous condenser, real time digital simulator
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