Online Pre-calculating System Stabilizing Controller
For Power System Operation

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Abstract
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   The online pre-calculating system stabilizing controller is a solution to prevent the occurrence of power system abnormalities such as system step-out, voltage instability, electrical overload, and frequency deviation, as well as the system-wide expansion of the abnormalities, in the event of power system faults. In case of a small-scale system fault, protection relay systems (a power line protection, a bus-bar protection, a transformer protection, and so on) can clear the fault to reduce the influence of the fault to the power system. However, it is increasingly anticipated that the current protection relay system cannot well reduce the influence by itself due to the further expansion and complication of power system. This controller has been developed to prevent the large-scale fault on such growing power system.

   This controller has four functions, which are a transient-stability maintenance function that quickly separates some generators and prevents system step-out on a system fault, a frequency regulation function to prevent a rapid frequency change, an electrical overload protection function to prevent the electrical overload of a power line or a transformer, and a voltage control function to prevent a rise and fall of system voltage and so on.

   This controller consists of three components, "Central processing unit", "Fault detecting unit", and "Generator shedding unit". "Central processing unit" obtains the system state which changes every moment, and performs the stability calculations/simulations for the assumed several faults in a constant cycle. When the result of stability calculation is unstable, "Central processing unit" choses objects (generator etc.) to control for stabilization and then transmits a control order to "Fault detecting unit". If a system fault actually occurs, "Fault detecting unit" detects a system fault and transmits control instructions (generator cut off etc.) to "Generator shedding unit" to execute the control according to the control order received from "Central processing unit". In this manner, this controller can prevent a large-scale blackout beforehand by reducing the influence from large scale system faults.