Paris Session 2022

An innovative power system stabilization method with augmented inertia synchronous condensers

A1 ROTATING ELECTRICAL MACHINES

PS1 – Generation mix of the future + Q 1.5 – Has the use of a PSS in conjunction with a synchronous condenser/compensator been generally applied in current installations and, in such cases, which control parameters have been chosen and what is the experience?

Pisani Cosimo, Italy

WADC ARCHITECTURE AND IMPLEMENTATION

The **WADC architecture** adopted in Terna power system **uses a Phasor Data Concentrator (PDC)** collecting Phasor Measurement Unit (PMU) measurements in some selected substations, to feed the Supervisory Control with the data necessary to elaborate the stabilizing signal, carried out by the **specific software developed in collaboration with EPRI**. Through a fast protocol, the WADC sends the set point to the field devices (augmented inertia synchronous condensers), in this case a customized PMU acts as an interface with the excitation system of the synchronous condenser. Through appropriate implementations, the excitation system injects the signal into the Automatic Voltage Regulator (AVR), which controls the excitation of the synchronous machine and allows the actual implementation of the set point.

Parameterization criteria

The parameters chosen for the characteristic transfer function of the **WADC** must guarantee a non-introduction of low-frequency harmonic components and a phase compensation in the range of interarea frequencies using wide area measurements.
PSS does the same job looking at local frequency.
Both the control can act exclusively or coexist.

Experience

Through field tests carried out both in open and closed cycle exciting the inter area mode of interest, an excellent behavior of the **WADC** system in **dampening** oscillations has occurred.

Tuning criteria

The **WADC** and **PSS** coexistence is proven to be effective into the field operation thanks to the proper choice of lead lag pole/zero locations.