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論　文　内　容　要　旨

報告番号	甲　先　第　352　号	氏　名	楊　松浩
学位論文題目	Generator Coherency Identification Method Based on Phase Trajectory Vector and Its Applications to Power System Transient Stability Control (位相軌跡ベクトルに基づく発電機のコヒーレンシー識別方法とその電力系統過渡安定度制御への応用)		

Generator Coherency (GC), which is defined as the similarity of generator angle curves after system suffers from large disturbances, plays a significant role in the power system stability assessment and control. The major difficulty of the work of Generator Coherency Identification (GCI) lies in two aspects, which are 1) the variation of GC due to the different system operating conditions and disturbances, and 2) the time-evolution of GC during the dynamic process.

To address the problems of GCI, a novel concept of Phase-plane Trajectory Vector (PTV) is proposed in this thesis. It can describe the dynamics of generators accurately with the aid of real-time measurement data from Phasor Measurement Units (PMUs). PTVs provide abundant information about generators' dynamics, which greatly improves the accuracy and speed of GCI. Compared with conventional GCI methods, PTV-based GCI method can adapt to the different system operating conditions and disturbances. Besides, it can track the time-evolution of GC during the dynamic process. Moreover, PTV based method also has advantages of efficient computation and flexible application.

Due to above-mentioned advantages, PTVs are used for two different scenarios: 1) Critical Machines (CMs) identification for Transient Stability Assessment (TSA) and 2) dynamic GCI for Controlled Islanding (CI).

In the proposed CMs identification scheme for TSA, PTVs are used to describe the dynamics of generators and the K-means clustering algorithm is applied to identify CMs and Non-critical Machines (NMs). The simulations in IEEE 39-bus power system show that the proposed method is more accurate than conventional methods in general cases. Moreover, the PTV-based method can track the time-evolution of CMs during the dynamic process.

In the proposed GCI scheme for CI, PTVs are used to describe the dynamics of generators and the hierarchical clustering algorithm is applied to determine the coherency of generators. Inspired by PTVs on the Phase Plane for Generators (PPG), a novel concept of Phase Plane for Buses (PPB) is proposed to determine the coherency of non-generator buses. The simulation results show that the proposed GCI scheme can identify the dynamic coherency of generator and buses, and make proper islanding strategy according to current system states.