Critical machine cluster identification using the equal area criterion

The paper introduces a new method to early identify the critical machine cluster (CMC) after a transient disturbance. For transient stability assessment with methods based on the equal area criterion it is necessary to split the generators into a group of critical and non-critical machines. The generators in the CMC are those likely to lose synchronism. The early and reliable identification of the CMC is crucial and one of the major challenges. The proposed new approach is based on the assessment of the rotor dynamics between two machines and the evaluation of their coupling strength. A novel coupling coefficient is derived and a cluster identification algorithm is developed. The algorithm determines the CMC based on the impact of the fault on the derived coupling coefficient of individual generator pairs. The results from two cases are presented and discussed, where the CMC is successfully determined just after fault clearance.

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