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Investigation of AC Current Transmission Capacity of 2G HTS Tapes Under Different Refrigeration Conditions

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Abstract—With higher critical current and temperature, 2G HTS tapes are hopefully applied in power system, such as HTS cables, transformers and generators. 2G HTS tapes usually transmit alternating current in power system. Although DC current transmission capacity of 2G HTS tapes is easily attained by critical current experiment, AC current transmission capacity of them has not been determined. In the paper, AC current transmission capacity of two types of 2G HTS tapes was investigated. In this study, the maximum AC current that 2G HTS tapes could transmit was determined, exceeding which HTS tapes cannot operate stably. AC loss would be generated in 2G HTS tapes under AC current, which could influence AC current transmission capacity. AC current transmission capacity and AC loss of 2G HTS tapes were measured under different frequency and refrigeration conditions. The obtained AC current capacity were compared with critical AC current based on the loss concept method. The experimental results were very significant for 2G HTS tapes used in power system.

Index Terms—2G HTS tapes, AC current transmission capacity, AC loss, AC critical current, different refrigeration conditions

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