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Stability Evaluation of MgB₂ Wire Based on Conduction Cooling

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MgB₂ - superconductors have been drawing attention in electric power and magnet applications at temperatures around 20 K. It is also a highly promising alternative superconductor in development of cryogen-free MRI system, thermal stability problem must be addressed in such an application while related studies about MgB₂ magnets or even coils are quite limited. Behavior of MgB₂ wires must be understood before large systems are introduced. Herein, two crucial and fundamental parameters evaluating thermal stability of MgB₂ wire: Minimum Quench Energy (MQE) and Normal Zone Propagation Velocity (NZPV) were theoretically and experimentally evaluated under the condition of self-field at 20K. The experiment was based on cryocooler cooling. As a basis for the thermal stability evaluation, to begin with, critical current was measured by transform method. Output of heater mounted on the wire was used to trigger normal zone propagation in MQE and NZPV measurements.

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