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Measurement of irreversible external-compressive strain and minimization of reversible bending radius on MgB₂ multifilament wire

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In previous studies, J_c -strain relation in the reversible range and the irreversible external-tensile strain (ϵ_{irr_t}) of MgB₂ filament were reported. In general, it is said that ϵ_{irr_t} is almost equal to the pre-compressive strain caused by cooling after heat treatment. In this study, the irreversible external-compressive strain (ϵ_{irr_c}) of MgB₂ multifilament wire was measured. In measurements, a copper plate was soldered to a sample wire, then the sample wire was bent while the copper plate was applied outward. ϵ_{irr_c} can be measured by evaluating I_c vs bending-radius relation, because the external tensile strain by bending is negligible in this situation. In the damaged sample wire, some buckling were observed in inner filaments on bending. It suggests that the irreversible damage was made by compressive strain. In addition, ϵ_{irr_c} of additional sample wires, which have larger pre-compressive strain and were heat treated by higher temperature were measured. The difference values between ϵ_{irr_t} and ϵ_{irr_c} of samples were roughly same value. From this results, we can minimize the reversible bending radius by controlling pre-compressive strain and thickness of copper plate.

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