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Mechanical properties and strain effect of various Nb3Al superconducting wires

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Nb3Al superconducting wires have high critical current and low strain sensitivity of the superconducting properties. Therefore, many Nb3Al wires were developed for accelerator or fusion magnets. In this study, critical current and mechanical properties of various Nb3Al wires were investigated. Some kinds of rapid heating, quenching and transformation (RHQT) processed Nb3Al wires were prepared. Young's modulus and tensile strain dependence of critical current for the Nb3Al wires were measured at 4.2 K and 18 T by the transport current measurement apparatus under tensile load. The strain was measured by the two-strain gauge method. The results show that the residual strains of Nb3Al wires are less than 0.1%. The strain sensitivity of Nb3Al wires were estimated by the power law. We found that the wires with small fracture strain have large strain sensitivity.

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