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Thu-Mo-Po.05-02: Research on Axial Tensile Characteristics of High Current CORC Cable

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The high temperature superconducting (HTS) CORC cable has the advantage of high flexibility, making it one of the best candidate cables for producing compact fusion magnets. The intense background magnetic field strength and high current in the fusion device will cause the CORC cable to be subjected to a huge axial tensile electromagnetic force. Excessive axial tensile load can cause irreversible degradation in the current carrying capacity of CORC cables. To achieve better control of plasma configuration in fusion devices, high current carrying CORC cables are necessary. At present, most of the research on the axial tensile performance is focused on CORC cables with critical currents less than 5000 A. Therefore, this article conducts axial tensile experiments on CORC cables with 24 layers of superconducting tapes and critical currents greater than 5000 A (77 K, self field). In addition, a CORC cable axial tensile simulation model is established to theoretically analyze the strain distribution of the cable under axial tensile load. The research results provide theoretical support for the application of CORC cables in compact fusion projects.

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