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Wed-Af-Po3.17-06 [34]: The Mechanical Analysis of the Rutherford Cable Subjected to Axial Tension

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The energy upgrade of the Large Hadron Collider (HE-LHC) and the Future Circular Collider (FCC) demand new requirements that the magnetic field of accelerate magnets should be up to 16 T. The Nb₃Sn Rutherford cable is used for magnet design. Due to the complex geometry and working conditions of the magnets, Rutherford cables have to suffer complex stress condition. To better understand the stress distribution and the deformation in the Rutherford cables when subject to loads, a three-dimensional model is built to analyze its mechanical behaviors. Firstly, the method to generate the geometric model of Rutherford cable is described. Then the mechanical behaviors of the Rutherford cable are analyzed when it is subjected to axial tension. The influence of friction coefficients and strand damage are considered. This analysis may help us to understand the role of friction coefficients and strand damage when the Rutherford cable is under tension condition.

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