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Study of bending behavior in Nb₃Sn strands

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The superconducting property of Nb₃Sn strands is very sensitive to strain. The transverse electromagnetic loading has been considered as a major origin of the degradation of Nb₃Sn cable-in-conduit conductor (CICC) due to the periodic local bending. The degradation of each strand due to this bending should be evaluated to calculate the performance of a CICC. Thus, an analytical model considered with the plastic deformation of copper and filament breakages was developed. The calculated results show good agreement with strain distribution measured by the neutron diffraction for uniformly bent Nb₃Sn strands. In addition, the critical current calculated by this model shows agreement with the test results.

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