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Quench Modeling in High-Field Nb₃Sn Accelerator Magnets

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In the framework of the LHC luminosity upgrade, the development of high field superconducting magnets is under way. The resulting peak field of about 12 T requires the use Nb₃Sn as superconductor. Due to the high stored energy density and the low stabilizer fraction, quench protection becomes a challenging problem. Accurate simulation of quench transients in these magnets is crucial to the design choices, definition of priority R&D and to prove that the magnets are fit for operation. In this paper we focus on the modelling of quench initiation and propagation, comparing numerical results with available experimental data.

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