

EDMS

Abstract to be submitted to ASC06

A finite-element model for electro-mechanical analysis of LHC main dipole magnet coils

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After years of studies and observations, the mechanical stability of the LHC main dipole magnets still remains an open issue. The robustness of these magnets has already been asserted and their reliability in operation is not far from being proven. However, the anomalous mechanical behavior sometimes observed is not yet completely understood. A finite element model, which has been recently developed at CERN, aims at providing an instrument for better explaining these anomalies. Cable modeling and contact between elements, friction and mechanical hysteresis are the key points of this model; the life cycle of a dipole coil is represented, from collaring and cooldown to the application of Lorentz forces. Important evaluations on magnet stability are proposed.