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FE simulation of 450 GeV injection error test

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Dynamic phenomena provoked by the rapid interaction of energetic particle beams with slender structures usually known as thermally induced vibrations are presented. Specific regard is given to the analysis of the accident case triggered by a beam injection error at 450 GeV, recently tested at CERN on LHC collimator prototypes.

A simplified analytical method, which was previously developed, has proved useful to obtain a preliminary estimation of the vibrations induced on a collimator jaw.

A 3D Finite Element model for thermo-structural fast-transient elastic-plastic analysis has been fully studied. The numerical method is carefully described with particular attention to initial conditions, boundary conditions

and integration scheme.

Numerical results are in good agreement with experimental measurements performed via Laser Doppler Vibrometer.

Co-authors: BERTARELLI Alessandro (CERN)

Summary

Primary author: DALLOCCHIO, Alessandro (CERN)

Co-author: BERTARELLI, Alessandro (CERN)

Presenter: DALLOCCHIO, Alessandro (CERN)

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