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O4.110 Simulation of disruptions in EAST tokamak

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Disruptions are one of the fundamental issues to be tackled in future tokamaks [1], due to significant eddy and halo currents in the conducting structures producing substantial electromagnetic forces and torques thanks to the interaction with the magnetic field. It is hence fundamental to have reliable modelling tools able to make prediction for future devices. The EAST tokamak [2] is equipped with fully superconducting poloidal and toroidal field coils and is designed and constructed to investigate the physical and engineering issues under steady state and long pulse operation for support of future fusion reactors. It is an ideal test-bed for the model validation, owing to its unique feature of having significant 3D current density patterns in the conducting structures during VDEs [3]. This is due to the presence of toroidally segmented stabilizing plates facing the plasma, in which significant "zig-zag" stabilizing currents may flow. In this paper, we show that the CarMa0NL code [4] is able to reproduce with remarkable accuracy the experimentally measured time traces of currents flowing in various parts of the tokamak during a disruption. The capability of the code of coupling an axisymmetric plasma with conductors with arbitrary 3D geometry allows us to demonstrate that in the events considered the halo currents do not contribute significantly to the currents measured in the supports, which are due mainly to eddy currents induced by plasma motion.

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