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Nonlinear Numerical Modeling of Fast Controlled Shut-Down in IGNITOR in The Presence of 3D Structures* R. ALBANESE, G. AMBROSINO, G. DE TOMMASI, A. PIRONTI, G. RUBINACCI, F. VILLONE, CREATE, G. RAMOGIDA, ENEA, B. COPPI, MIT — In Ignitor. the avoidance and mitigation of plasma disruptions can play an important role in its safe operation. These objectives pose additional constraints on the performances of an accurate integrated plasma position, shape and current control. This system can indeed be an effective aid to disruption avoidance and mitigation as well as to achieve a fast controlled shut-down. In these cases, a suitable redistribution of the currents in the PF coils system is very effective. Previously, we analyzed a control strategy leading to the redistribution of the currents in the PF coil system without modifying too much the plasma shape. Here, we test the constraints affecting the time needed to implement a suitable dynamic currents allocation also in view of a fast controlled shutdown. To this purpose we use a computational tool, called CarMa0NL, with the unprecedented capability of simultaneously considering three-dimensional effects of conductors surrounding the plasma and the inherent nonlinearity of the plasma behaviour itself, in the presence of the complex set of circuit equations describing the control system. *Sponsored in part by the US DOE.

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