

Abstract Submitted
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Beyond the Intelligent-Shell concept: the Clean-Mode-Control

PAOLO ZANCA, LIONELLO MARRELLI, GABRIELE MANDUCHI, GIUSEPPE MARCHIORI, Consorzio RFX Euratom-Enea Association, Corso Stati Uniti 4, 35127 Padova, Italy — Due to their discrete nature a grid of active coils for the feedback control produces an infinite sequence of sideband harmonics in the magnetic field. If the sensors have the same periodicity as the coils, as in the Intelligent Shell scheme, the aliasing of the sidebands determines a systematic error on the Fourier analysis of the measurements. This is a drawback for the control of those perturbations that cannot be suppressed by the feedback, but only reduced in their saturation level, as the non-linear tearing modes of reversed field pinches. We have derived analytical formulas for the subtraction of the sidebands, implemented in a real-time correction algorithm of the Fourier analysis. The Fourier harmonics so obtained are used as feedback variable of a new control scheme named Clean-Mode-Control (CMC). The first tests of CMC in RFX-mod have given interesting results in the tearing modes control: besides a reduction of the edge radial field and the plasma surface distortion, systematic rotations with frequencies up to 100Hz are seen. These phenomena will be interpreted using a MHD model of the CMC.

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