Optimization for low-aspect-ratio RFP configuration in RELAX

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PACCAGNELLA, Consorzio RFX — Equilibrium analyses have shown that the
aspect ratio A is one of the important parameters for optimization of the RFP con-
figuration because it affects the q profile or fraction of the pressure-driven bootstrap
current. RELAX (A=R/a=0.5m/0.25m) is a low-A RFP machine to explore the
potential advantages of low-A configurations. The discharge and plasma parameters
in RELAX to date are as follows: plasma current up to 100kA, discharge duration
of up to 2.5ms, electron density in the range from 0.2 to 2.0 10^{19} m^{-3} from interfer-
ometer, and electron temperature $\sim$ 100eV from double-filtered soft- X ray (SXR)
measurements. We will describe two extreme discharge regions, i.e., extremely deep
reversal and very shallow reversal regions, attained in RELAX. Extremely high Θ
(up to $\sim$ 3.5), deep reversal (F down to $\sim$ - 1.5) regions have been attained in
RELAX without discrete relaxation events. Edge magnetic fluctuation level is lower
for the discharges in the extremely deep reversal region. On the other hand, in very
shallow-reversal region where F $\sim$ 0, helically deformed hot core has been identified
using SXR imaging diagnostics. Behavior of the MHD instabilities in these two
interesting regimes will be discussed.

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