Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Scaling Laws of Confinement Parameters for the Advanced Reversed Field Pinch JON-ERIK DAHLIN, JAN SCHEFFEL, Royal Institute of Technology, ALFVN LABORATORY, ROYAL INSTITUTE OF TECHNOLOGY, STOCKHOLM, SWEDEN TEAM — A series of resistive magnetohydrodynamic numerical simulations are performed to generate scaling laws for energy confinement time τ_E and poloidal beta β_p for the advanced reversed field-pinch (RFP). Strongly improved scaling with basic initial parameters is obtained as compared to the conventional RFP. Early results indicate an improved scaling of τ_E with plasma current I and line density N compared to the conventional RFP on the order of τ_E (*adv.*) / τ_E (*conv.*) $\propto (I/N)^{0.29} I^{0.29}$. The improved behavior of the advanced RFP as compared to the conventional, uncontrolled RFP stems from the introduction of current profile control (CPC). In the present numerical simulations, CPC is performed by implementation of a *parameter free* automatic feedback algorithm, optimized to reduce the fluctuation caused $\left\langle \tilde{\mathbf{v}} \times \tilde{\mathbf{B}} \right\rangle$ electric field. The scheme introduces an ad-hoc electric field within the plasma volume, automatically adjusted to dynamically control the plasma into more quiescent behavior by eliminating current driven tearing mode instabilities and reducing resistive interchange modes.

Jon-Erik Dahlin

Date submitted: 22 Jul 2005 Electronic form version 1.4