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Physics and engineering design of KTX Reverse Field Pinch WENZHE MAO, USTC, China, KTX TEAM — KTX is a large RFPinch device which is now proposed in the USTC. The maximum plasma current is 1 MA with discharge duration longer than 100 ms. The aspect ratio of KTX is 3.5(R/a=1.4/0.4 m). High temperature plasma will be achieved in KTX with T_e ~1 KeV and n_e ~2x10^{19} m^{-3}. Stainless steel is used as the inner chamber wall for its mechanical strength and the better plasma-wall interaction properties. Particularly, it is also suitable for the intended lithium wall experiment. The thickness of the stainless steel is 6mm corresponding to a time constant of 2ms. In order to guarantee a high plasma quality, a second passive copper shell with a thickness of 1.5mm (t~20ms) will be attached tightly to, but insulated from, the vacuum vessel to stabilize fast-growing MHD modes, especially in the current ramp-up phase. Moreover this modular shell structure will simplify the planned active MHD control system. The details of the air core Ohmic-heating winding, the toroidal field (TF) winding and the equilibrium field winding are provided. Calculations have been done to minimize the stray field and design an equilibrium state in KTX. Special attention has also been paid to the design of the TF coils to reduce the ripple field and to obtain good diagnostic accessibility. Based on the energy balance principle and the alpha model, the KTX discharge has been simulated. The model also gives the requirements for the different power supply systems.

Jinlin Xie
University of Science and Technology of China

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