



A new colliding and merging field-reversed configuration (FRC) in KMAX tandem mirror

Munan Lin, Ming Liu, Peiyun Shi, Yanpeng Wang, Hong sen Yi, Zida Yang and Xuan Sun

Department of Modern Physics, University of Science and Technology of China, Hefei, 230026, China

A large-size field-reversed configuration (FRC) plasmoid to explore the physics of colliding and merging process has been produced in a tandem mirror device by collision-merging two high- β compact toroids (CT) technology. Compared with other FRC experiments, the KMAX-FRC has a distinct feature: the in-vessel θ -pinch coils. One of the goals of KMAX-FRC is to explore the effects of in-vessel FRC formation stage. Separation of the formation region from the high voltage θ -pinch coils makes it convenient to install various diagnostic facilities to diagnose the target plasma and offers a key engineering advantage for potential future fusion reactor designs. Fundamental KMAX-FRC properties are diagnosed by a comprehensive diagnostic suite, like, interferometry, magnetic probes, excluded-flux array, triple probe, bolometry, spectroscopy, fast-framing camera. These diagnostics are essential to support the primary goal of a deep understanding of the physics of magnetic reconnection and fusion research. The FRC internal magnetic field structure has been proved by inserting a multi-channel magnetic probe. The preliminary results show that the total temperature of KMAX-FRC plasma is $T_e + T_i \approx 60 \text{ eV}$, the electron density is $n_e \approx 2.5 \times 10^{18} \text{ m}^{-3}$ and the plasma life time is about $300 \mu\text{s}$.

References

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