# Global Motion of Field-Reversed Configuration Plasma

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It is known that a field-reversed configuration (FRC) plasma produced by a negative-biased theta-pinch method oscillates slowly radially (wobble motion) and axially (vertical displacement) around the equilibrium position, that are called global motions. It is considered that the kinetic energy of the motions is introduced into the plasma at the formation phase. Closed field lines to confine the high temperature plasma are formed at the end regions of the theta-pinch coil through a magnetic reconnection between a bias field and a main field. When the magnetic reconnection progresses naturally, non-uniformity of a preheated plasma and a wall contamination of a discharge tube disturb the symmetrical reconnection to form the closed lines. In this case, a momentum to trigger the global motions is generated.

If the magnetic reconnection is executed at the fixed axial position with good azimuthal symmetry, the FRC will keep the equilibrium position through the configuration lifetime. For this purpose, thin metal liners that consist of SUS304 with 0.3mm thickness and 0.3m width are installed along the discharge tube near mirror regions of the coil. A skin time of the liners is adjusted as they affect only the magnetic reconnection during the formation phase. For example, the skin time is about 10μs at preliminary experiment, which corresponds to about tenfold of a pinch time and a half the time till the equilibrium phase.

By installing the liners, the amplitude of the wobble motion becomes less than 50% of that without liners. That is, the radial shift of the separatrix axis from the coil axis is controlled within 10% of the separatrix radius. Clear results about the vertical displacement are not obtained at present. Since the displacement is also controlled by strength of the mirror field and a distance between the mirror regions and the plasma, a careful analysis of the motion is needed.