Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Spatial distribution of toroidal flow velocity in a field-reversed configuration palsma TOMOHIKO ASAI, TSUTOMU TAKAHASHI, TAICHI OKANO, SHINGO HIROMORI, YOSHIKI MATSUZAWA, YASUYUKI NOGI, Nihon University, TOSHIKI TAKAHASHI, Gunma University — Rotational instability with toroidal mode number n = 2 is the only destructive instability in a field-reversed configuration (FRC) plasma. Therefore, investigation of source of toroidal spin-up and its spatial property are longstanding problems in the FRC research to improve configuration lifetime. In this work, radial velocity profile of toroidal rotation has been measured with a newly built polychrometer. From the ion Doppler shift measurement of impurity ions, radial profile of toroidal flow was observed. The toroidal flow inside the separtrix start to increase just after the formation and the flow velocity is gradually increased. The velocity is comparable with the ion diamagnetic velocity at 25 μs. But the flow velocity out side the separatrix keeps small value or settled. Therefore, there is shear of toroidal flow in the vicinity of the separatrix. The effect of this observed shear on higher toroidal mode number of the interchange instability has been investigated. This could be a reason why the higher mode of toroidal deformation has never been observed in the FRC experiments contrary to theoretical expectations.

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Date submitted: 21 Jul 2006 Electronic form version 1.4