Systematic investigation of anomalous transport contribution on the energy transport of LHD plasmas via application of integrated transport analysis suite TASK3D

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The Large Helical Device (LHD) experiments have steadily expanded the parameter regime of helical plasmas [1]. The energy confinement scaling for helical plasmas was deduced as ISS04 [2], in which, Gyro-Bohm characteristics was confirmed, and the configuration effect, such as effective helicity, was also pointed out.

To increase physics understandings on energy confinement in helical (and furthermore toroidal, in general) plasmas, systematic physics analyses should be performed incorporating radial profiles based on 3-dimensional equilibrium. The integrated transport analysis suite, TASK3D [3], being developed, has made this progress possible. As one of TASK3D applications to LHD experiment, a wide-range comparison between experimental and neoclassical energy balance has been made to reveal “anomalous” contribution on the energy transport in LHD plasmas. This systematic investigation is expected to increase the predictive capability in scenario development towards future experiments and reactor design study.

The progress of such comparison will be reported in the conference, and parameter dependence to be elucidated will be compared to that obtained from simulation study such as described in Ref.[4].