An attempt for the thermal transport modelling of fusion plasmas based on the statistical approach: Beyond the conventional scaling for the energy confinement time

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A statistical approach has been attempted for the thermal transport modelling for plasmas in fusion experiment [1]. It can provide regression expressions for the heat diffusivities, to be valuable for predicting the temperature profile evolution. This approach should outstrip the conventional scaling laws for the global confinement time since it also deals with profiles (temperature, density, heating depositions etc.). This approach has become possible with the analysis database accumulated by the extensive application of the integrated transport analysis suite, TASK3D-a [2], to the LHD (Large Helical Device) experiment at NIFS [3]. After the first attempt that was published in Ref. [1], the validity check of the obtained regression expression for the ion heat diffusivity profiles has been made through its implementation into the predictive TASK3D calculations to be compared with several LHD experimental results.

Furthermore, the improvement for statistical treatment has been promoted by establishing collaborations with experts in statistics. The first attempt [1] and the successive progress will be reported in the workshop, as one of possible and innovative “data-driven” approaches “ in fusion research.

Acknowledgements: The author appreciates valuable advices on statistics from Prof. K. Shimizu and Prof. Y. Iba (The Institute of Statistical Mathematics, ISM). Dr. H. Yamaguchi (National Institute for Fusion Science) is also acknowledged his contributions for validity check of this approach. This work has been supported by the NIFS Collaborative Research Programs, NIFS14KNTT025, NIFS14UNTT006 and NIFS18KNTT046, and by the ISM Collaborative Research Program, H30-1002. The participation to this workshop is supported by the NINS Joint Research Program.

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