Thermal transport in ergodic region of collisionless toroidal plasma

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In recent tokamak experiments, it has been found that so-called diffusion theory based on the " diffusion of magnetic field lines" overestimates the radial energy transport in the ergodic region of the collisionless plasma affected by resonant magnetic perturbations (RMPs), where the RMPs induce chaotic behavior of the magnetic field lines. The result implies that the modelling of the transport should be reconsidered for low collisionality cases. A computer simulation study of the transport in the ergodic region is required for understanding fundamental properties of collisionless ergodized-plasmas, estimating the transport coefficients, and reconstructing the modelling of the transport. By using a drift kinetic equation solver without the assumption of nested flux surfaces, it is possible to execute such investigation. We report the simulation study of the thermal transport in the ergodic region under the assumption of neglecting effects of an electric field, impurities and neutrals; we should simplify conditions deciding state of the plasma, due to the estimation of transport coefficients affected only by the Coulomb collisions and RMPs. Because of a limited computational-time, we treat ions (protons) in our numerical-study of the transport. We find that the thermal conductivity in the ergodic region is extremely small compared to the one predicted by the theory of field-line diffusion and that the conductivity depends on both the collision frequency and the strength of RMPs even for the collisionless ergodized-plasma.