Neoclassical Toroidal Viscosity Calculations in Tokamaks using a $\delta f$ Monte Carlo Simulation and Their Verifications\textsuperscript{1} SHINSUKE SATE, National Institute for Fusion Science, JOHN-KYU PARK, Princeton Plasma Physics Laboratory, HIDEO SUGAMA, RYUTARO KANNO, National Institute for Fusion Science — Effect of magnetic perturbation on plasma rotation is an important issue in tokamaks, since recent studies have shown that perturbation as small as $\delta B/B_0 \sim 10^{-4}$ can induce significant rotation damping. A new simulation to calculate neoclassical toroidal viscosity (NTV) in tokamaks with weak non-axisymmetric perturbation has been developed by adopting the $\delta f$ Monte Carlo method [1]. Previous benchmark has proven that in $E \times B \to 0$ limit the simulation result agrees well with the combined analytic formula by Park [2] in wide range of collision frequency [3]. In the presentation, further benchmark results of NTV calculation will be reported for the cases with finite $E \times B$ rotation and toroidal flow. Non-local (finite-orbit-width) effects on NTV, which may appear only in the $\delta f$ simulation, will also be investigated.

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