Torus Streamlines in the 3D Steady Lid-driven Cavity Flows KATSUYA ISHII, ITC, Nagoya University, CHIKARA OTA, CES, Nagoya University, SHIZUKO ADACHI, Tokyo International University — Streamlines of the incompressible vortical flows in three-dimensional rectangular cavities with different aspect ratios are numerically studied for several Reynolds numbers by using a combined compact finite difference (CCD) scheme with high accuracy and high resolution. The flow is driven by a lid moving tangentially with constant speed. Non-dimensional geometrical parameters of the cavity are the depth-to-width aspect ratio $\Gamma$ and the span-to-width aspect ratio $\Lambda$. The flow parameter is the Reynolds number $Re$. We study the flow structures in the square cavity ($\Gamma=1$) with the spanwise aspect ratios $\Lambda=1$ and 6.55 for $Re$ from 100 to 400. Torus streamlines are obtained from the velocity field of the steady incompressible flow. Several other streamlines show chaotic behavior. They are equivalent to a non-autonomous Hamiltonian system of one-degree-of-freedom. In order to examine the features of the flow pattern with different parameters, we analyze the Poincare sections in the cross sections of cavities.