

§37. Activity of Virtual Reality Task Force

Ishiguro, S., Ohtani, H., Miura, H., Nakamura, H., Mizuguchi, N., Shoji, M.,
Virtual Reality Task Force

Since NIFS Virtual Reality (VR) System “CompleXcope” was installed in 1997, it has been developed continuously (Fig.1).

Developments of new software such as, VFIVE, AVS for CAVE, sonification and automatic speech recognition system have been performed. By using these new tools CompleXcope has been made use for scientific investigation such as analysis of MHD simulation results for MHD dynamo and spherical tokamak, analysis of molecular dynamics simulation results for chemical sputtering of plasma particle on divertor, analysis of particle simulation of magnetic reconnection, analysis of fluid simulation of turbulence, and analysis of satellite observation data of solar, and so on.

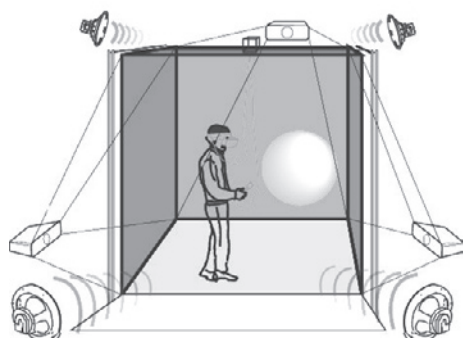


Fig. 1: CAVE system.

In February 2008, we have constructed realistic inner vessel of LHD in the VR space. Though visitors cannot usually enter the real inner vessel, they can enter the VR inner vessel. They took delight in experiencing it (Fig. 2).

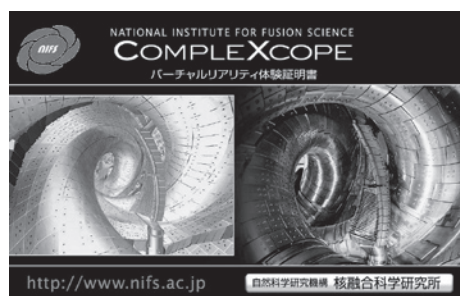


Fig. 2: Visitors card.

For scientific VR visualization using the CAVE system, we develop two pieces of software to analyze the

results of the plasma particle simulation and the molecular dynamics simulation, respectively.

First one is the software for the plasma particle simulation [1]. We can trace the trajectories of plasma particles in the electromagnetic field obtained by the particle simulation. The orbit of a single particle is calculated by integrating the Newton-Lorentz equation. We can point the initial position of particle by the 3-D mouse “Wand.” The initial velocity is obtained by the Box-Muller method with the flow velocity which is given by simulation data. Using this software, it is clearly shown that the meandering motion of particles is related to the reconnection mechanism.

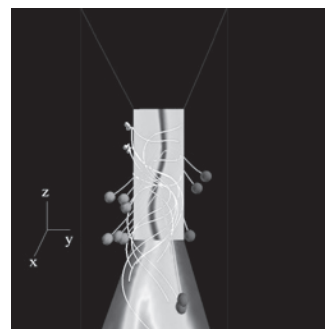


Fig. 3. CAVE visualization of plasma particle simulation results.

Second one is the software for molecular dynamics simulation [2]. This software can display the dynamics of molecules in VR space according to the time-sequential molecular simulation results. VR visualization with CAVE enables us to directly watch the energy flow in the complicate molecular and crystal structures, in which magnitude of energy current is shown by color and the direction of it is shown by arrow.



Fig. 4. CAVE visualization of molecular dynamics simulation results.

- 1) Ohtani, H. and Horiuchi, R.: PFR **3** (2008) 054.
- 2) Ito, A. et al: Proceeding of 27th meeting of Japan Society for Simulation Technology, (2008) 365.