§8. CompleXcope — Virtual Reality System for Scientific Visualization

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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 solar corona, molecular dynamics, turbulence, magnetic reconnection and so on.

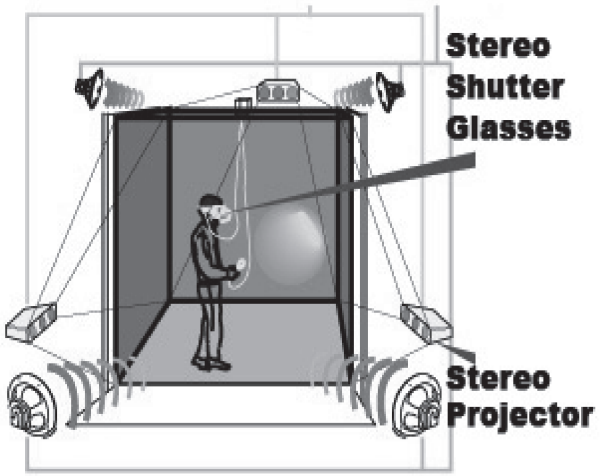

Fig. 1. CompleXcope (Virtual Reality System for Scientific Visulalization. It consists of four screens, stereo projectors, stereo shutter glasses, wand (controller), 3D stereo sound system and graphic workstation.

As a collaborative study with Kitasato University, we apply it to medical study. Imaging of human body in CompleXcope was developed.

We have done Virtual Reality network project by the support of Telecommunications Advancement Organization of Japan (TAO). Here, we have constructed a communication network system of the virtual reality systems, where a researcher on any site can control the connected virtual reality systems and own jointly the same VR image. We have also developed a system where the virtual images of researchers (avatars) are transmitted from one virtual space to others, and vice versa.

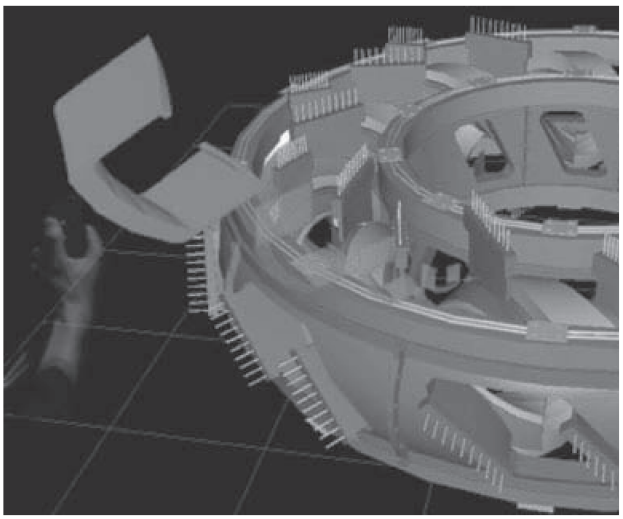

Fig. 2. Design aid tool for fusion reactor. We can represent an object which is compiled by a conventional 3-D CAD system into the virtual reality space. This system can detect the interference between objects in real time and we can simulate practical assembling parts.

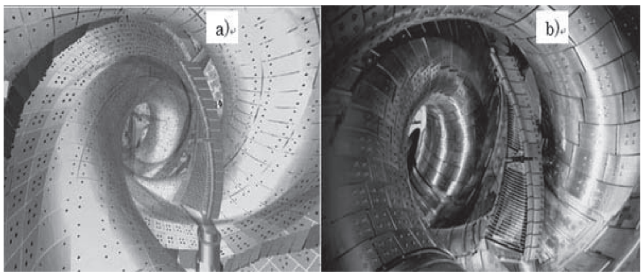

Fig. 3. VR picture (a) and real picture (b) of inside of LHD vacuum vessel. Plasma is shown in VR. We can see ion cyclotron heating device.

Recently, we have extended the application of VR to new fields. For example, we have developed a design aid system (Fig. 2) to represent an object which is compiled by a conventional 3-D CAD system into the virtual reality space. This system can detect the interference between objects in real time and we can simulate practical assembling parts. 3-D CAD system and this system provide us an effective environment to model complicated structures such as the helical-type fusion reactor. In February 2008, we have constructed realistic inner vessel of LHD in the VR space (Fig. 3). By using this system, we can easily recognize the geometric relations among plasma control device, plasma heating device, measurement device and plasma in a vessel. This will be applied to support for design of new device in a vessel.