§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 Visualizaition. 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.