

# §1. Development of Computer Code for Visualization of LHD Magnetic Field Line Structure

Watanabe, T., Akao, H. (NEC)

We have constructed new computer code systems for the visualization of LHD magnetic field lines based on the present computer programs developed one by one.

The new code systems composed of two parts:

## 1. Computation of Magnetic Field

The new code can correspond to any coil shape (superconducting filament coil, body current coil). Biot-Savart law is integrated by double exponential formula or extremely high order Gauss-Legendre integrator to guarantee the high accuracy. The computer program are vectorized thoroughly and prepared for general purpose use.

## 2. Visualization of Magnetic Field Line

This system include the 3D spline function scheme with very high order, field line tracing with high order Runge-Kutta scheme(8 Stage, 6 Order), treatment of LHD structural materials (vacuum vessel wall, ICRF antenna, inserted limiters, etc ).

The new code system is written by fortran90 and possible to use in the super computer (SX5) or in personal computers. Several numerical examples are shown in the followings.

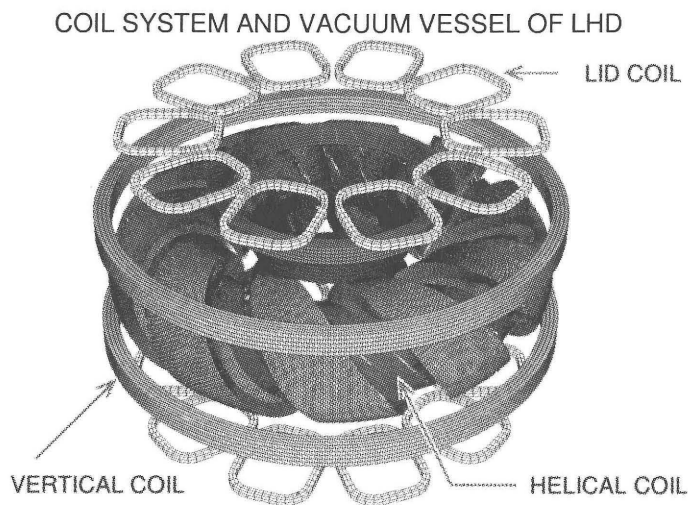


Fig.1 Coil System of LHD.

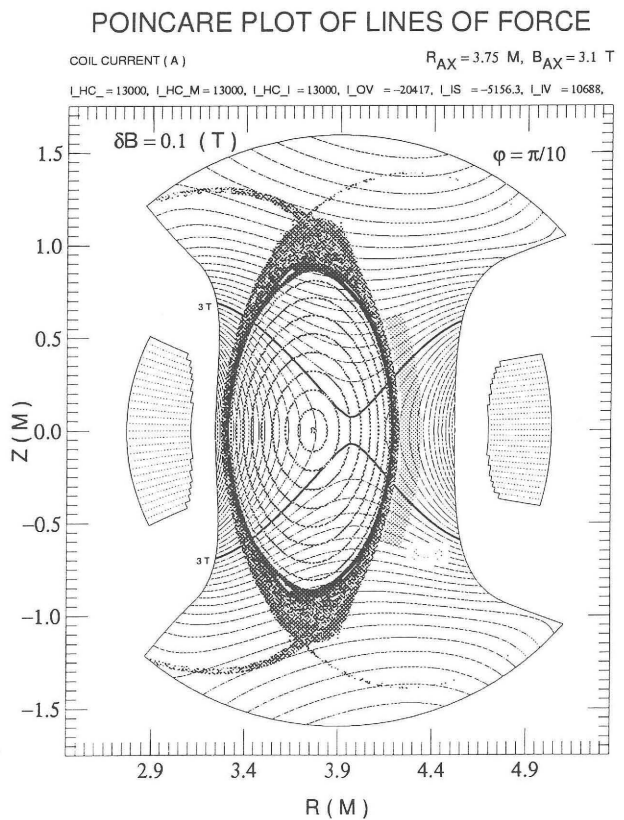
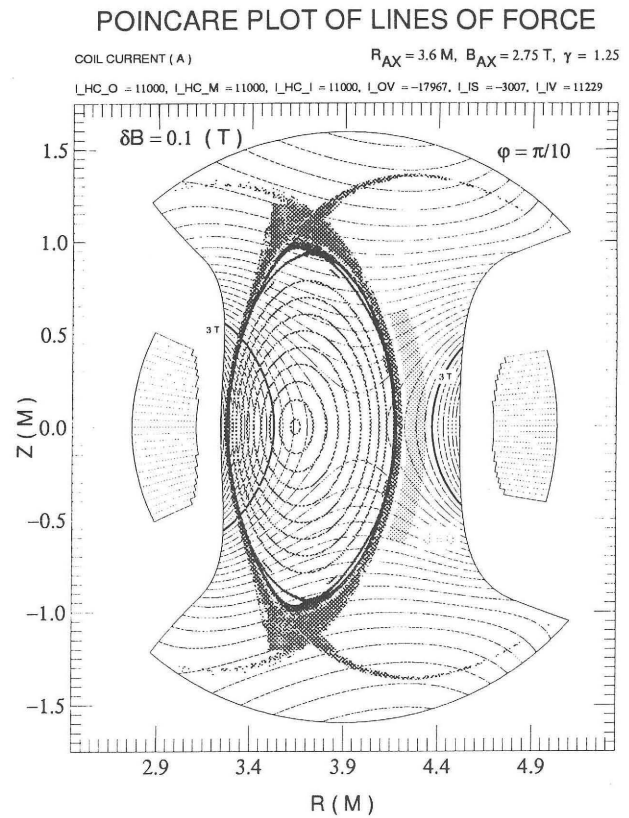


Fig.2 Contour plot of  $|B|$  and Poincaré plot of field lines. Cross section of ICRF antenna is also shown. Position of magnetic axis  $R_{ax}$  is 3.6m (upper side) and 3.75m (lower side).