

§14. Helical Magnetic Configuration with Remote Divertor

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Numerical studies for drift orbits of high energetic particles have shown excellent confinement of the large helical device (**LHD**).[1] Scientific proof for steady state sustainment of high density and high temperature is very promising for **LHD**. Succeeding machine of **LHD** will target to work out fusion engineering problems, key issues of which are rational disposal of high heat flux from core plasma, simple supporting structure of coil systems under strong magnetic force and high economical efficiency for construction. Succession of scientific results of **LHD** is also important.

New helical magnetic configuration is considered here from these point of views. To reduce the construction cost, the modular coil system is adopted. To simplify the supporting structure, modular coil is composed of smooth connections of straight pillar parts and simple arc parts. Since D shape cross section of magnetic surface is desirable for the high performance of plasma containment, each modular coil is elongated in axial direction. Rational disposal of high heat flux is realized by remote divertor system.

An example of new coil system is shown in Fig.1 by perspective view. Coil system is composed of 10 sets of modular coils of same structure. The distributions of rotational angle and well of the magnetic field is plotted in Fig.2. The structure of magnetic surface is shown in Fig.3 together with details of chaotic structure of peripheral field lines. Remote divertor configuration is realized by adding of another sets of modular coil to extract divertor field lines from the core plasma region.

Reference

- (1) Watanabe, T., Hatori, T. and Ishida, A., Kakuyugou Kenkyu, **68**(1992) 298.

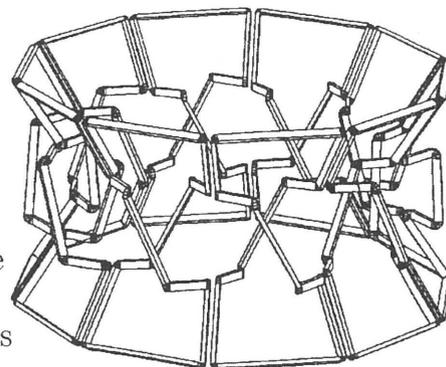


Fig.1
Perspective
view of
coil systems

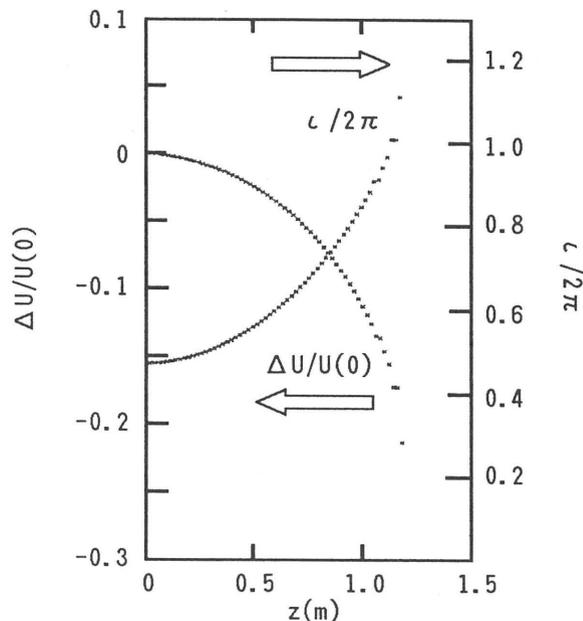


Fig.2 Rotational transform and magnetic well

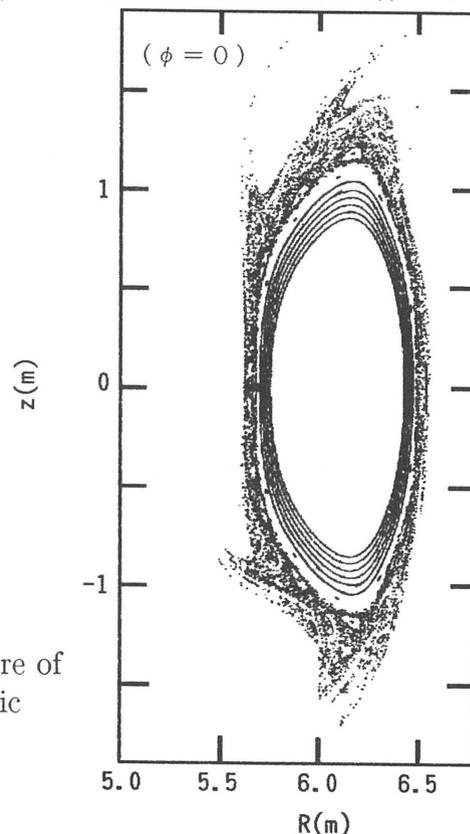


Fig.3
Structure of
magnetic
surface