

§17. Mostly Magnetic Well Configuration Produced with Limiter

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Magnetic well is formed in CHS when the magnetic axis is shifted outward. It appears from the region near the axis and its area increases as the axis shift increases. The boundary region still remains in the magnetic hill, but a strong magnetic shear gives the ideal MHD stability. Hence the Mercier stability condition is satisfied for all confinement region. The resistive interchange mode is however expected to be unstable in the boundary region which can be one candidate of fluctuation related with anomalous transport.

The experiment was planned to take off such a boundary region with a limiter. The magnetic well profile is shown in Fig. 1 for $R_{ax} = 99.5$ cm configuration with an average beta 0.8 %. The limiter was inserted to 75 % minor radius position. The global confinement time roughly followed the scaling value which takes into account of the reduction of minor radius.

The magnetic fluctuation was measured with movable pickup coils which was inserted in the boundary region of plasmas. Upper graph of Fig. 2 shows the power spectrum of measured fluctuation and the coherence between the individual pickup coil signals is shown in the bottom graph of Fig. 2.

Figure 3 shows the radial profile of local fluctuation level measured with a pickup coil array for three different shots. The rms value between 60 to 70 kHz is taken as a coherent signal and that between 100 to 110 kHz is used to give an incoherent level. Open circles show the fluctuation profile for the discharge without a limiter. The fluctuation level at the same location decreased (shown by triangles) when the limiter was inserted to make the plasma radius smaller. But the local fluctuation level at the new boundary (shown by squares) showed the similar level to the larger boundary case though the magnetic hill region almost disappeared. More theoretical analysis for the resistive interchange stability is necessary.

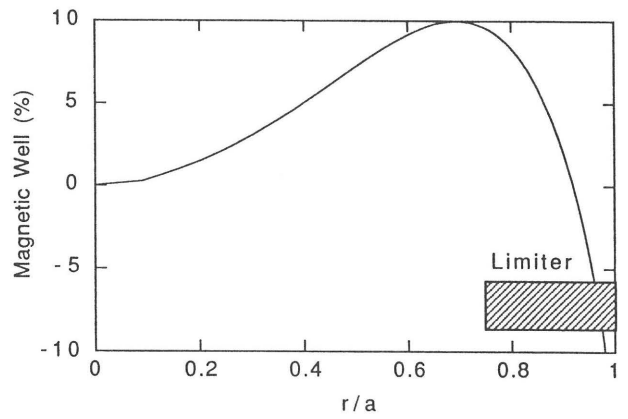


Fig. 1 Magnetic well for an outward shifted case

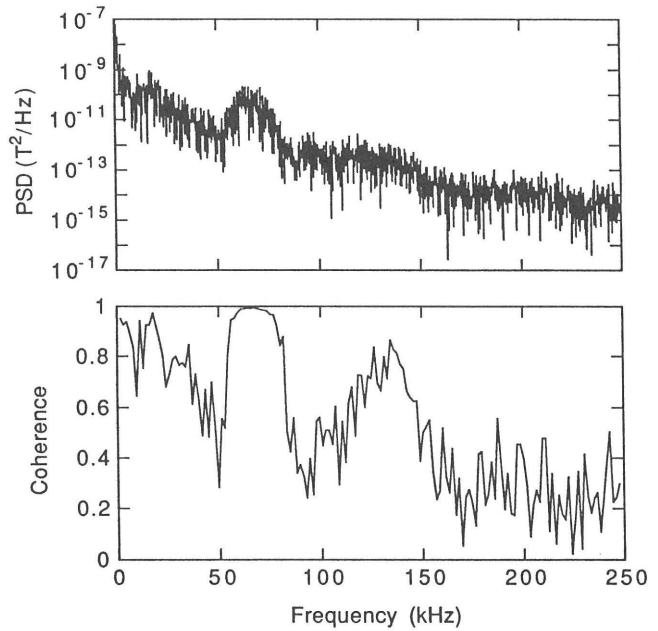


Fig. 2 Power spectrum and coherence of signals

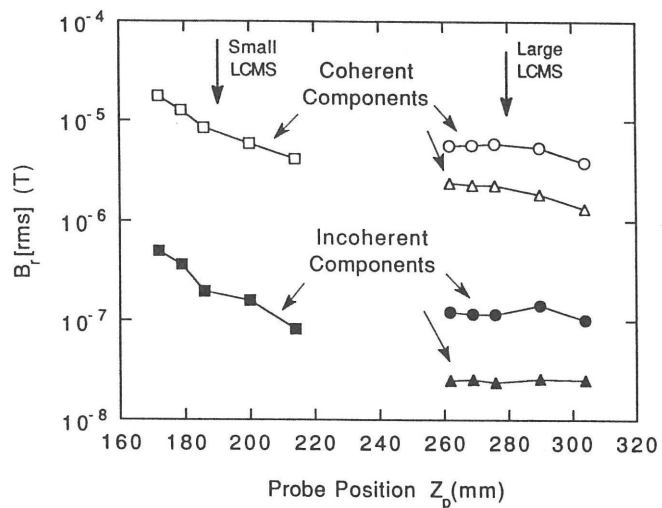


Fig. 3 Fluctuation profiles w/o and with limiter