

## §46. Non Inductive Current Drive and Steady Operation in the Divertor Onfiguration in QUEST

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### Long pulse operation of the non-inductive current driven plasma in the divertor configuration

It has been demonstrated that a diverted spherical plasma with  $\sim 15$  kA at  $B_t=0.13$  T could be sustained for 40 s non-inductively driven by 8.2 GHz at 60 kW[1,2]. The main research purpose is to achieve alone the plasma current with RF both in limiter and divertor configurations. In this experiment the O-mode with  $N_{||}\sim 0.4$  was injected. The cyclotron resonance locates at  $R\sim 0.29$  m (0.58 m for 2<sup>nd</sup>). As shown in fig.1,  $I_p$  could be ramped up to 17 kA until 2 seconds in the limiter configuration and then sustained in the single null divertor configuration for 38 seconds. The operation width was limited by the limiter temperature of 1000 °C located on the outboard side. This heat load corresponding to  $\sim 10$  kW is deposited by lost energetic electrons outside the last closed flux surface. When the temperature was increased and  $H_{\alpha}$ , as a measure of the recycling at the wall and limiters, was also increased at  $\sim 20$  seconds,  $I_p$  started to decay. Next year a new limiter cooled by water will be installed. The start-up physics have been studied by analyzing V-I characteristics of a scanning probe and orbit simulation[3-4]. Plasma wall interaction is investigated from several views of points[5-9]. The traces and material damages have been analyzed using an impurity orbit following code including the TF ripples[5]. The permeation probe measurements and numerical simulation for the permeation curve have been compared and they also support the progress of the wall pumping in the ECR-DC and full year campaign [6,7]. Dust analysis in TRIAM-1M has been continued in QUEST[8]. Fundamental study of D retention on W materials done in the linear device has been reported[9]. The fluctuation study has been done in the slab configuration and during current ramp-up phase[10-13].

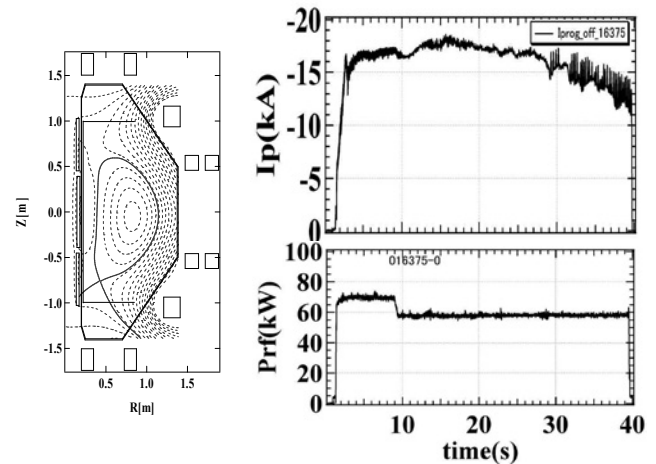


Fig. 1 Magnetic surfaces,  $I_p$ , RF power in the divertor configuration

Langmuir probe and fast camera have been used to investigate the effect of the connection length and blob velocity. The new diagnostics and FB control method have been progressed[14-15].

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