§24. Motion of Localized of Radiative Structure with Magnetic Island in LHD Plasmas

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Detached plasmas can be used to reduce the heat load to the divertor in a fusion reactor. In LHD we have observed that the addition of an m=1/n=1 magnetic island (MI) can enhance detachment by localizing the radiation at the x point of the magnetic island [1, 2]. In the last year we brought an additional infrared imaging video bolometer (IRVB) into operation on LHD and have observed the detached radiation pattern from both tangential and semitangential fields of view. In this report the change in the radiation pattern with the relocation of the magnetic island as predicted by the EMC3-Eirene model [3] is observed by two infrared imaging video bolometer s.

In Figures 1(a) and 2(a) the results of carbon edge radiation from the model are integrated into the field of view of the tangential infrared imaging video bolometer for magnetic islands located at the 6-O and 7-O ports, respectively. In Figures 1(b) and 2(b) the respective corresponding tangential infrared imaging video bolometer data are shown. In Figures 1(c) and 2(c) the corresponding data from the semitangential infrared imaging video bolometer are shown.

From these results we can conclude that (1) according to the model the magnetic island x-point and the radiation localized therein moves up when the island is relocated from the 6-O to the 7-O port as seen in Figures 1(a) and 2(a). (2) The data from the tangential infrared imaging video bolometer shown in Figures 1(b) and 2(b) show a similar radiation patterns and motion. (3) The data from the semitangential infrared imaging video bolometer shown in Figures 1(c) and 2(c) also show an upward motion of the radiation pattern when the magnetic island is moved from the 6-O port to the 7-O port.

Future work will include bringing a third infrared imaging video bolometer with a top view into operation and modeling the radiation from both the top and semitangential infrared imaging bolometers.

[1] M. Kobayashi et al., Phys. Plasmas. **17** 056111 (2010).
[2] B. J. Peterson et al., accepted for publication in J. Nucl. Mater.
[3] Y. Feng et al., Contr. To Plasma Physics **44** 57 (2004).

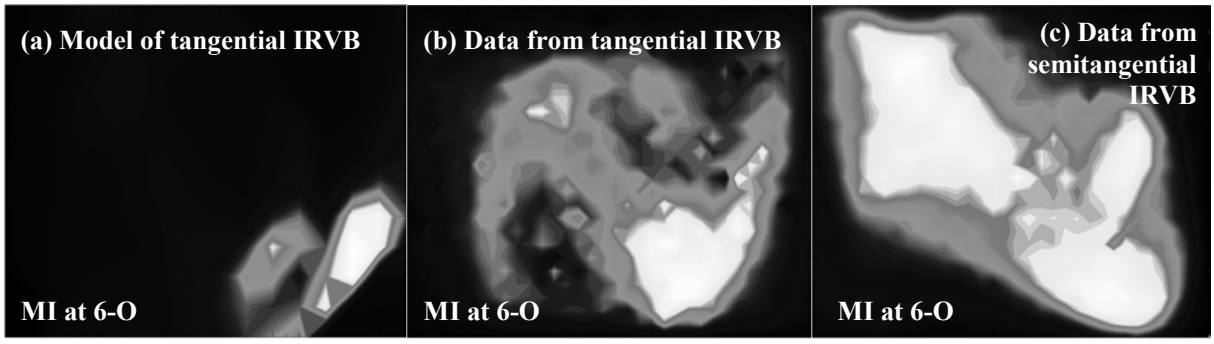

Fig. 1 Case with MI at 6-O. (a)Model results line-integrated into tangential infrared imaging video bolometer field of view, (b) tangential IRVB data and without and (c) semitangential IRVB data.

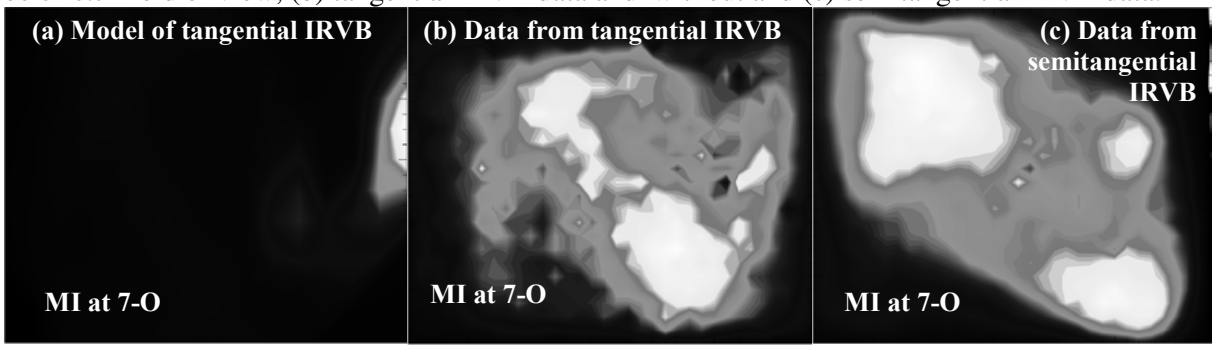

Fig. 2 Case with MI at 7-O. (a)Model results line-integrated into tangential IRVB field of view, (b) tangential IRVB data and without and (c) semitangential IRVB data.