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ICRF Compatibility with Metallic PFCs: Implications for ITER¹ S.J. WUKITCH, D. BRUNNER, M.L. GARRETT, A. HUBBARD, B. LABOM-BARD, Y. LIN, B. LIPSCHULTZ, D. MILLER, R. OCHOUKOV, M.L. REINKE, J.L. TERRY, MIT PSFC — Application of ion cyclotron range of frequency (ICRF) heating remains a major challenge in devices with metallic plasma facing components (PFCs) due to impurity contamination and enhanced heat loads. For standard ICRF antennas, where the antenna straps are aligned to the toroidal magnetic field, core impurity contamination in devices with all high Z metal PFCs [C-Mod, AUG] and devices with a mixture of low and high Z PFCs has been observed.[JET] The Impurity contamination, both sources and transport, and enhanced heat loads are thought to linked to RF electric fields parallel to the magnetic field, E||. One means to minimize E||is through geometry: field align the ICRF antenna where the antenna straps and antenna box are perpendicular to the total magnetic field. Initial results confirm that the field aligned antenna has reduced impurity source at the antenna, reduced impurity contamination, reduced RF enhanced heat flux to the antenna, and is more load tolerant than a standard ICRF antenna. Another approach to mitigate impurity contamination utilizes low Z impurity seeding, i.e. nitrogen or neon. The core high Z impurity contamination and the RF enhanced plasma potential are reduced with seeding. Finally, an emerging explanation for the presence of far field sheaths, fast wave field converting to slow wave field at conducting surfaces where the magnetic field is at an oblique angle, will be presented and its implication for ITER discussed.

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