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Category Number and Subject:

[ ] Theory [**x**] Experiment

Applications of Fast Wave in Spherical Tokamaks,[*] S.C. Chiu, V.S. Chan, Y.R. Lin-Liu, R.L. Miller, R. Prater, P.A. Politzer, *General Atomics* — In spherical tokamaks (ST) the magnetic field strength varies over a wide range across the plasma, and at high beta it deviates significantly from the 1/R dependence of conventional tokamak. This, together with the high density expected in ST, poses challenging problems for rf heating and current drive. In this paper, we investigate the various possible applications of fast waves (FW) in ST. The adjoint technique of calculating current drive is implemented in the ray-tracing code CURRAY. The applicability of high harmonic and subharmonic FW to steady state ST is considered. We find that high harmonic FW tends to be totally absorbed before reaching the core and may be considered a candidate for off-axis current drive while the subharmonic FW tends to be absorbed mainly in the core region and may be considered for central current drive. A difficult problem is the maintenance of current at the startup stage. In the bootstrap rampup scenario, the current rampup is mainly provided by the bootstrap current. Under this condition, the role of rf becomes mainly the sustainment of plasma through electron heating. Using a slab full-wave code SEMAL,[1] we find that the ion-ion-hybrid mode conversion scheme is a promising candidate. The effect of possible existence of edge Alfvén resonance and high harmonic cyclotron resonance is investigated and regimes of minimization of edge heating identified.

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[1]O. Sauter, thesis.

[**x**] Prefer Poster Session

[ ] Prefer Oral Session

[ ] No Preference

[ ] This poster/oral should be placed in the following grouping: (specify order)

[ ] Special Facilities Requested (e.g., movie projector)

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Submitted by:

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