Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Kinetic Alfven Waves Driven by Rotating Magnetic Island in Tokamaks[1] M.S. CHU, V.S. CHAN, P.A. POLITZER, D.P. BRENNAN, M. CHOI, L.L. LAO, H.E. ST JOHN, A.D. TURNBULL, GA — Kinetic Alfven waves (KAWs) result from modification of the Alfven wave through the FLR effect of the ions. In high temperature plasmas, they are weakly damped and can be approximated as natural eigenmodes of the tokamak with a full set of discrete spectrum that depends on the plasma density, safety factor and temperature profiles. These waves may be driven resonantly to large amplitudes by appropriate boundary perturbations at these resonant frequencies such as the case of a natural rotating magnetic island. The resultant amplitude depends on the damping mechanism. The theory of the spectrum of the KAW in tokamaks with general cross-sections is formulated and its spectrum studied numerically. The consequence of these excited KAW includes the possibility of steady state current drive and the scattering of energetic particles. This may provide an explanation for the observation of the clamping of the q0 value in hybrid discharges in the presence of a rotating 3/2 island [1].

[1] P.A. Politzer, et al., 32nd EPS Conf. on Plasma Physics, Tarragona, Spain (2005).

[1]Work supported by US DOE under DE-FG03-95ER54309.

M.S. Chu
General Atomics

Date submitted: 29 Aug 2006 Electronic form version 1.4