Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Dominance of second growth rate peak in Alfvénic behavior and instability transition of relativistic electromagnetic ion cyclotron instabilities near threshold[1] SHIH-HAO LEE, KUAN-REN CHEN, HUNAG-KUI CHEN, National Cheng Kung University, Taiwan — The second peak of the growth rate spectrum has a weaker driving term than the first peak. This driving term is extra due to relativistic effect. Surprisingly, numerical results show that, for higher fast ion energy such as 14.7 MeV, the second peak has managed to overcome the Alfvénic condition of a cubic instability near the threshold while the first peak remains stable. From the analytical theory, the threshold slow ion temperature increases with the fast ion energy. The effect of finite slow ion temperature is more important at higher wave number regime for the slow ion cyclotron resonance, but not for the non-resonant slow ion inertia. As a result, their balance on determining the coefficient P in the dispersion relation is changed. Thus, the P peak moves to higher wave number regime near the second peak from where the first peak locates. The Alfvénic condition is first satisfied near the P peak. Thus, the second peak appears first near the threshold; the first peak overcomes the condition later. When the slow ion temperature or density is about twice than that of the threshold, the second peak has transited from the cubic to a coupled quadratic instability while the first peak remains as the cubic instability.

[1]This work is supported by National Science Council, Taiwan. (94-2112-M-006-012)

Kuan-Ren Chen
Physics Department, Institute of Electro-optics,
Plasma and Science Center, National Cheng Kung University, Taiwan

Date submitted: 25 Jul 2006 Electronic form version 1.4