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Thermonuclear Yield Due to the Relativistic Electron Bernstein Modes in Spherical Tokamak Plasmas*

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Abstract

A model for an efficient control of anomalous absorption in Spherical Tokamaks (ST) is proposed. In this model an external electron cyclotron waves, O- or X-mode, excite relativistic Electron Bernstein Mode[1] harmonics (EB harmonics) at the edge region of ST plasma. Nonlinear relativistic EB harmonics, in turn, propagate toward the central region of ST, whereby they are effectively absorbed in the electron cyclotron harmonic resonance region.

The scaling laws for the thermonuclear yield, ratio of the thermonuclear power to the external power, for the case of excitation of EB harmonics, n(EB) + (n-1) (EB), n= 2… 6 harmonic number, are obtained. The plasma-ignition criterion is analyzed in terms of O- and X-Mode power.

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[1] V. Stefan, **Anomalous Absorption of High-Harmonic Relativistic Electron Bernstein Modes in Spherical Tokamak Plasmas**, 2007 American Physical Society April Meeting Saturday–Tuesday, April 14–17, 2007; Jacksonville, Florida