

Abstract Submitted
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Advances in the Accretion Theory of the Spontaneous Rotation Phenomenon¹ M. LONTANO, CNR, Italy, B. COPPI, MIT — The accretion theory [1] of the spontaneous rotation phenomenon has found further confirmation in the series of experiments carried out by the Alcator C-Mod [2] and DIII-D machines [3]. This theory was the first based on having the source of angular momentum near the edge of the plasma column so that a change of the edge configuration can effect the velocity of rotation. This has been verified by the Alcator C-Mod experiments with lower and upper null configurations exhibiting drastically different toroidal velocities. The intrinsic coupling between spontaneous rotation and thermal energy transport involved in the accretion theory is consistent with the observed relationship [2] between the change of rotation velocity from the L-confinement regime to the H-confinement regime and the scaling of the threshold to attain the H-regime. The DIII-D experiments involving electron cyclotron heating have confirmed the existence of spontaneous rotation and shown the toroidal velocity to be proportional to $(T_e/T_i)W_{th}$ where W_{th} is the total thermal energy of the plasma column and the (T_e/T_i) ratio is consistent with the excitation of the ITG modes that can carry angular momentum toward the center of the plasma column [1].

[1] B. Coppi, *Nucl. Fusion* **42**, 1 (2002).

[2] J. Rice et al, 20th IAEA Fus. En. Conf CN-116/EX/6- 4Ra.

[3] J.S. deGrassie et al, 20th IAEA Fus. En. Conf CN- 116/EX/6-4Rb.

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