Noninductive plasma initiation and startup in the DIII-D tokamak

G.l. Jackson[1], D.A. Humphreys[1], A.W. Hyatt[1], J.M. Lohr[1], T.C. Luce[1], and J.H. Yu[2]

[1]*General Atomics, P.O. Box 85608, San Diego, California 92186-5608, USA*

[2]*University of California-San Diego, San Diego, California, 9500 Gilman Dr., La Jolla, California 92093-0417, USA*

Abstract

Noninductive plasma startup with 2nd harmonic electron cyclotron heating has been studied in DIII-D. Plasma currents up to 33 kA have been obtained in this phase. The maximum current obtained was primarily limited by the experimental time and does not necessarily represent the highest achievable current. The dominant physical mechanism for the observed current is the Pfirsch Schlüter current on open field lines. Closed flux surfaces have been observed, but in a rather limited region, compared to previous experiments in spherical tokamaks. This method of plasma initiation and initial current ramp might be used in future burning plasma devices in conjunction with other current drive techniques to provide a fully noninductive startup.