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The Toroidal Helicon Experiment at IPR MANASH KUMAR PAUL, Institute for Plasma Research, Bhat, Gandhinagar-382428, India — Successful demonstration of plasma current drive by low-frequency bounded whistlers, launched in a toroidal vacuum chamber of small aspect ratio, near lower-hybrid frequency, motivated the novel study of wave induced helicity current drive in helicon wave generated plasma. Helicon discharge, produced in a toroidal vacuum chamber of small aspect ratio, shows strong poloidal asymmetry in the wave magnetic field components. Owing to this strong poloidal asymmetry in the wave magnetic field structures, a nonresonant current is driven in plasma by the dynamo electric field, which arise due to the wave helicity injection by helicon waves. Simultaneous rise in wave helicity is observed when the input RF power is increased. Study of parametric dependence of plasma current in very high frequency operating regime, along with numerical estimations of nonresonant components, has been done. Based on the excitation of toroidal bounded whistlers, which sustain the discharge, a new approach to the problem of current drive is discussed. Close agreement between the numerical estimations and the experimentally obtained plasma current magnitudes clearly delineates the plasma current due to wave-induced helicity from other possible resonant or nonresonant sources at present parameter regime. Preliminary results of helicon current drive experiments and comparison with the numerical estimations are presented.

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