An Overview of Turbulence and Transport Studies on LAPD

T.A. Carter, J.E. Maggs, P. Popovich, D.W. Auerbach, S. Vincena, B. Friedman, D. Schaffner, and M. Umansky
Dept. of Physics and Astronomy, UCLA

An overview of research in turbulence and transport on the Large Plasma Device (LAPD) will be presented. LAPD plasmas are produced by discharge using a large-area emissive cathode and have the following typical plasma parameters: $n_e \sim 10^{12}\text{cm}^{-3}$, $T_e \sim 5\text{eV}$, $T_i \lesssim 1\text{eV}$, $400 < B < 2000\text{G}$, plasma length $L \sim 17\text{m}$, plasma radius $a \sim 30\text{cm}$, plasma pulse length $\tau \sim 10-20\text{ms}$. A variety of experiments on instabilities, turbulence and transport have been performed in LAPD, making use of capabilities to create controlled pressure gradients and drive flow and flow shear using biasing. Recent research highlights include: an H-mode like transition in particle confinement triggered by bias-driven flow and flow shear[1], studies of intermittent turbulence and coherent structure generation[2], and interaction between drift-waves and Alfvén waves. In addition, an effort to perform comparisons between turbulence simulation and LAPD data is underway, focusing on validation of the 3D Braginskii fluid turbulence code BOUT. More details of these highlights will be presented, along with a discussion of capabilities of the LAPD facility and future plans for studies in turbulence and transport.

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[2]D. C. Pace, M. Shi, J. E. Maggs, G. J. Morales, and T. A. Carter, Phys. Plasmas 15, 122304 (2008); D. C. Pace, M. Shi, J. E. Maggs, G. J. Morales, and T. A. Carter, Phys. Rev. Lett. 101, 085001 (2008); T. A. Carter, Phys. Plasmas 13, 010701 (2006)