ABSTRACT

The objective of the fusion theory program at General Atomics (GA) is to significantly advance our scientific understanding of the physics of fusion plasmas and to support the DIII-D and other tokamak experiments as well as ITER research activities. The program plan is aimed at contributing significantly to the Fusion Energy Science, the Tokamak Concept Improvement, and ITER goals of the Office of Fusion Energy Sciences (OFES). Significant progress was made in each of the important areas of our research program during the last grant year GY08. This includes development of a working model of the pedestal height EPED1 based on physics parameters that have been successfully shown to have the most impact on the pedestal height in DIII-D experiments, identification of low and high-n energetic-particle driven Toroidal Alfven Eigenmodes (TAEs) in gyro-kinetic calculations using the GYRO code, development and extensive testing of the new trapped gyro-Landau fluid (TGLF) transport model, performance of comprehensive numerical experiments using the GYRO code aimed at understanding the fundamental "zonal-flow/drift-wave paradigm," and development of a new gyro-kinetic neoclassical transport code NEO-GK and a new Integrated Modeling and Fitting tool IMFIT to support tokamak research and operation.

This work supported by the U.S. Department of Energy under Grant No. DE-FG03-95ER54309.