NEUTRAL PRESSURE DYNAMICS IN THE UPPER PLENUMS IN THE DIII–D TOKAMAK

R. Maingi,* J.G. Watkins,† M.A. Mahdavi, R.J. Colchin*

General Atomics
San Diego, California
United States of America

ABSTRACT. We present the dependence of the neutral pressure rise on strike point geometry in the upper divertor inner and outer plenums in the DIII–D tokamak. The upper outer plenum pressure increases with proximity to the plenum opening in a manner similar to previous reports of the lower outer plenum pressure. The inner plenum pressure measurement is modulated up to a factor of two by edge-localized modes (ELMs) particle flux, due to the small plenum volume and resulting short equilibration time constant. Reasonable agreement is obtained between the measured dependence of outer plenum pressure on strike point position and simulations with an analytic neutral transport model, using the time-averaged (i.e., long compared with the ELM period) divertor profiles as inputs. Modeling of the inner plenum pressure data with time-averaged profiles passes through the data envelope. In addition, modeling with two other sets of profiles, one averaged in the vicinity of ELMs and the other between ELMs, brackets the upper and lower envelopes of the data. These new data sets represent an independent test and the agreement confirms that the basic physics in the model is responsible for the dependence of pressure rise on strike point geometry in the long mean free path limit.

*Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA
†Sandia National Laboratories, Albuquerque, New Mexico, USA