Prediction of the fusion alpha density profile in ITER from local marginal stability to Alfvén eigenmodes

R.E. Waltz[1] and E.M. Bass[2]

[1]General Atomics, P.O. Box 85608, San Diego, California, 92186-5608, USA
[2]University of California-San Diego, 9500 Gilman Dr., La Jolla, California 92093, USA

Abstract. A simple radial transport code for predicting the fusion alpha density profiles in an ITER burning plasma unstable to Alfvén eigenmodes is illustrated. This extends earlier work by Angioni et al [Nucl. Fusion **49**, 055013 (2009)] treating the fusion alpha transport from high-n micro-turbulence to include marginal stability (or "stiff") transport from alpha driven low-n Alfvén eigenmodes (AEs). The local alpha density gradient AE thresholds are provided by physically realistic linear gyrokinetic code simulations. The transported alpha density profiles are compared to the alpha classical slowing down profiles dependent on the birth rate source profiles. The base case thermal plasma (and hence source) profiles are taken from a theory-based core transport and H-mode pedestal prediction of ITER performance by Kinsey et al [Nucl. Fusion **51**, 083001 (2011)]. The distinction between the alpha particle and the much smaller alpha energy transport loss is emphasized.

PACS Nos: 52.35Ra, 52.25Fi, 52.30Gz, 52.55Fa, 52.65Ti