Energetic ion transport by microturbulence is insignificant in tokamaks

D.C. Pace (庞大卫),[1, a)] M.E. Austin,[2] E.M. Bass,[3] R.V. Budny,[4] W.W. Heidbrink,[5] J.C. Hillesheim,[6] C.T. Holcomb,[7] M. Gorelenkova,[4] B.A. Grierson,[4] D.C. McCune,[4] G.R. McKee,[8] C.M. Muscatello,[5] J.M. Park,[9] C.C. Petty,[1] T.L. Rhodes,[6] G.M. Staebler,[1] T. Suzuki,[10] M.A. Van Zeeland,[1] R.E. Waltz,[1] G. Wang,[6] A.E. White,[11] Z. Yan,[8] X. Yuan,[4] and Y.B. Zhu[5]

[1)] *General Atomics, PO Box 85608, San Diego, CA 92186-5608, USA*

[2)] *University of Texas-Austin, 2100 San Jacinto Blvd, Austin, TX 78712-1047, USA*

[3)] *University of California, San Diego, 9500 Gilman Dr., La Jolla, California 92093-0417, USA*

[4)] *Princeton Plasma Physics Laboratory, PO Box 451, Princeton, NJ 08543-0451, USA*

[5)] *University of California, Irvine, University Dr., Irvine, CA 92697, USA*

[6)] *University of California, Los Angeles, PO Box 957099, Los Angeles, CA 90095-7099, USA*

[7)] *Lawrence Livermore National Laboratory, 7000 East Ave, Livermore, CA 94550-9234, USA*

[8)] *University of Wisconsin-Madison, 1500 Engineering Dr., Madison, WI 53706, USA*

[9)] *Oak Ridge National Laboratory, PO Box 2008, Oak Ridge, TN 37831, USA*

[10] *Japan Atomic Energy Agency, 801-1, Mukoyama, Naka, Ibaraki-ken 311-0193, Japan*

[11] *Massachusetts Institute of Technology, 77 Massachusetts Ave, Cambridge, MA 02139, USA*

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Energetic ion transport due to microturbulence is investigated in magnetohydrodynamic-quiescent plasmas by way of neutral beam injection in the DIII-D tokamak [J.L. Luxon, Nucl. Fusion **42**, 614 (2002)]. A range of on-axis and off-axis beam injection scenarios are employed to vary relevant parameters such as the character of the background microturbulence and the value of E_b/T_e, where E_b is the energetic ion energy and T_e the electron temperature. In all cases it is found that any transport enhancement due to microturbulence is too small to observe experimentally. These transport effects are modeled using numerical and analytic expectations that calculate the energetic ion diffusivity due to microturbulence. It is determined that energetic ion transport due to coherent fluctuations (e.g., Alfvén eigenmodes) is a considerably larger effect and should therefore be considered more important for ITER.

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[a] Electronic mail: pacedc@fusion.gat.com