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A Unified Theory of Toroidal Momentum Transport and Momentum Transport Bifurcations by Drift Wave Turbulence[1] P.H. DIAMOND, C. MCDEVITT, O.D. GURCAN, University of California, San Diego, La Jolla, CA 92093-0424 USA, T.S. HAHM, Princeton Plasma Physics Laboratory, Princeton, NJ 08543-0451 USA, V. NAULIN, Risoe National Laboratory, Roskilde, DK-4000, Denmark — We present a unified theory of toroidal momentum transport, treating both resonant and non-resonant particle contributions. A general momentum conservation theorem is proved, which relates momentum density evolution to the resonant particle momentum flux, the wave momentum flux and a refractive force due to straining of wave packets. The wave momentum flux is calculated using a Chapmen-Enskog like expansion of the wave kinetic equation. The results are used to explain a new class of momentum transport bifurcation. Possible origins of hysteresis are discussed.

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