Abstract Submitted
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Parallel closure theory for toroidally confined plasmas[1] JEONG-YOUNG JI, ERIC D. HELD, Utah State University — We solve a system of general moment equations[2] to obtain parallel closures for electrons and ions in an axisymmetric toroidal magnetic field. Magnetic field gradient terms are kept and treated using the Fourier series method. Assuming lowest order density (pressure) and temperature to be flux labels, the parallel heat flow, friction, and viscosity are expressed in terms of radial gradients of the lowest-order temperature and pressure, parallel gradients of temperature and parallel flow, and the relative electron-ion parallel flow velocity. Convergence of closure quantities is demonstrated as the number of moments and Fourier modes are increased. Properties of the moment equations in the collisionless limit are also discussed. Combining closures with fluid equations parallel mass flow and electric current are also obtained.

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[2]J.-Y. Ji and E. D. Held, Phys. Plasmas 15, 102101 (2008).

Jeong-Young Ji
Utah State Univ

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