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The effect of electron-ion collisionality on ETG turbulence[1] GREG COLYER, Culham Centre for Fusion Energy, ALEX SCHEKOCHIHIN, University of Oxford, COLIN ROACH, Culham Centre for Fusion Energy, MICHAEL BARNES, University of Oxford, YOUNG-CHUL GHIM, KAIST, BILL DORLAND, University of Maryland, FELIX PARRA, University of Oxford — In electrostatic simulations of MAST plasma at electron-gyroradius scales with adiabatic ions, using the local flux-tube gyrokinetic code GS2, we find that the saturated electron heat flux decreases as the electron collisionality decreases. At early simulation times the heat flux quasi-saturates at a level independent of electron collisionality; however the zonal fluctuation component continues to grow slowly until much later simulation times, eventually reducing the heat flux at low collisionality. The heat flux at the longest simulation times is the saturated level relevant to energy transport, in the gyrokinetic expansion. We outline an explanation based on zonal-nonzonal interactions and the scaling of the zonal damping rate with electron-ion collisionality, and we discuss the correlation times of the zonal and nonzonal components of the microturbulence. Improved energy confinement with decreasing collisionality has previously been observed on NSTX and MAST, and is favourable towards the performance of future, hotter devices.

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