Phase Space Analysis of Hybrid Kinetic-MHD Simulations
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TEAM — We present new phase space analysis of energetic particle simulations
using the hybrid kinetic-MHD option[1] in the NIMROD code.[2] The intent of these
new δf PIC[3] phase space diagnostics is to help elucidate the physics of energetic
particle interactions with MHD modes. In particular we will examine the evolution
of δf in $(v_{\parallel}, v_{\perp})$ space and convolution of the terms in the δf evolution equation.
The contributions from passing and trapped subpopulations are also examined and
both are shown to contribute significantly to energetic particle-MHD mode evolu-
tion. This phase space analysis reveals that the region near the trapped/passing
boundary is a key region of activity. The analysis is in its developmental stage and
primarily phenomenological, but continued development and refinement will mature
these tools to quantitative and potentially predictive measurements.

[1]C. C. Kim, *PoP*, **15** 072507 (2008)
[2]C. R. Sovinec et al., *JCP*, **195** 355 (2004)
[3]S. E. Parker and W. W. Lee, *PFB*, **5** 77 (1993)

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