Nonlocal Neoclassical Calculation of Anisotropic Properties in NSTX

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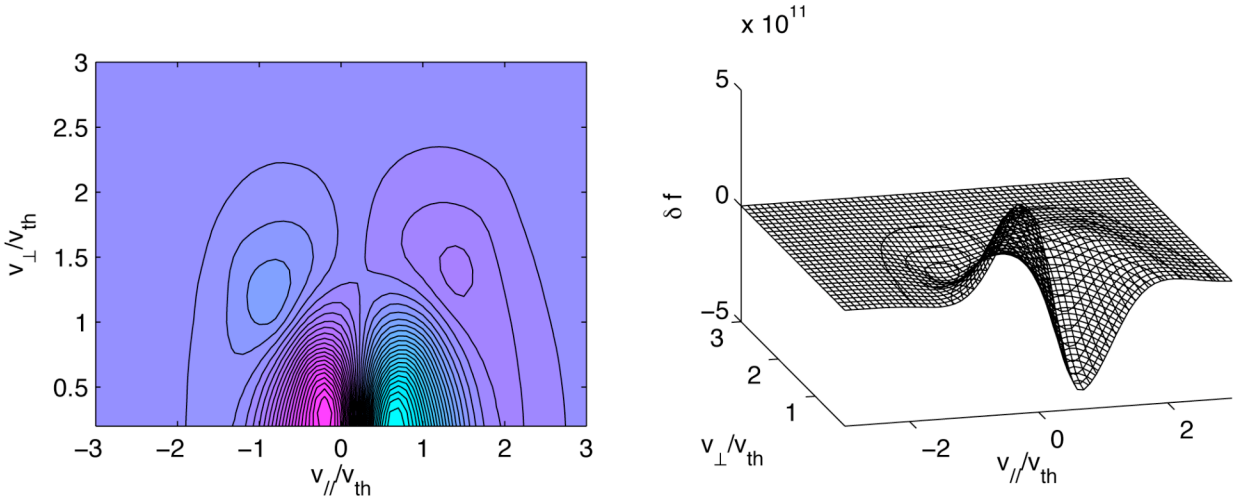
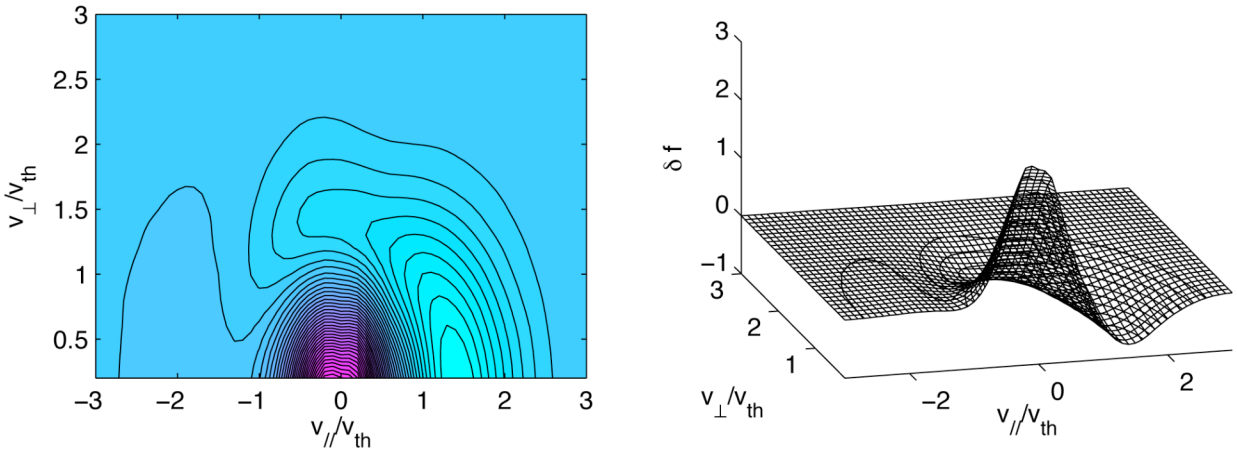
- Aside: GEM code is still being debugged by Y. Chen (U. Colorado - Boulder) and G. Rewoldt, but is not yet producing usable results for realistic experimental cases.
- GTC-Neo is Weixing Wang's δf particle-in-cell code, with finite-orbit-width (banana width) width, which make the transport nonlocal. We are now extending it to examine temperature perturbations $\delta T_{\perp}$ and $\delta T_{||}$ coming from δf (see following slides for preliminary NSTX results).
- Also plan to extend GTC-Neo to calculate toroidal angular momentum transport, and also poloidal velocity and poloidal angular momentum transport.

GTC-Neo Preliminary results for NSTX 121314a01, t = 0.325 s

r/a = 0.5, θ = 0

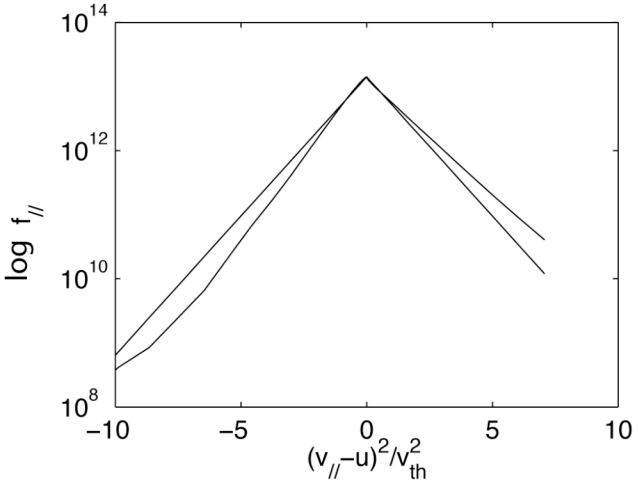


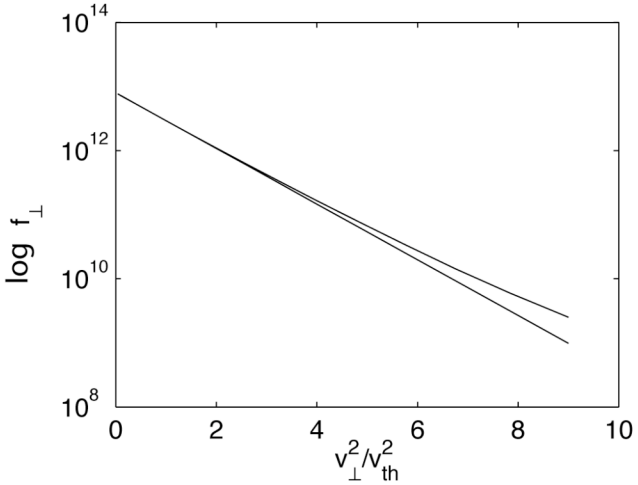
r/a = 0.5, θ = π

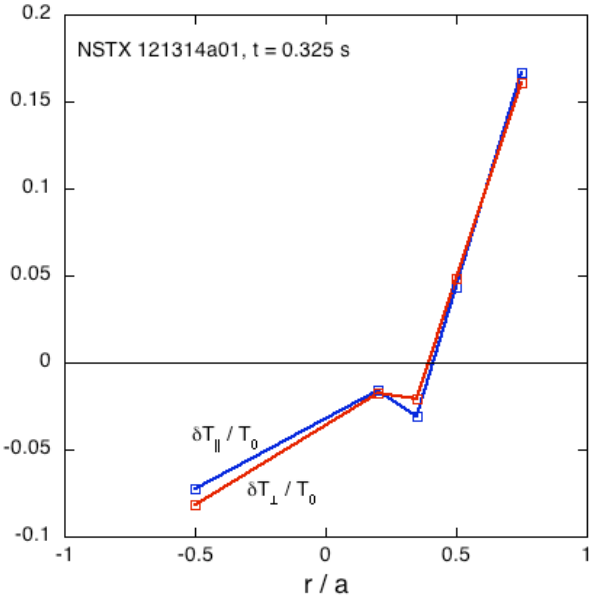


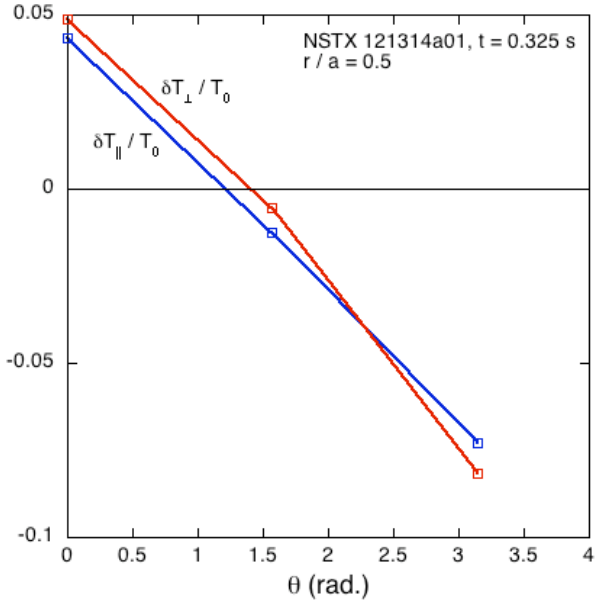
- Contour plots and perspective plots of δf on outboard midplane and inboard midplane
- Strong differences in δf at two locations

GTC-Neo Preliminary results for NSTX 121314a01, t = 0.325 s









- In $v_{||}$ and $v_{\perp}$ distributions, log plots should be straight lines for Maxwellians. Some departure from Maxwellians
- $\delta T_{||}$ and $\delta T_{\perp}$ not very different
- Corresponding $\delta T_{||}$ and $\delta T_{\perp}$ have strong r and θ variation. Thus flux surface is not temperature isosurface! Variation may be big enough to measure with PCHERS