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Energy transport across the dayside cusp during magnetic storms

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The physical understanding of particle transport from the magnetosheath across the dayside magnetopause bounaary is still incomplete. Most observations to date have used the first two moments of the distribution function to study the transport of mass and momentum across the dayside magnetopause. We have recently begun to investigate the behavior of the third moment, the energy flux tensor, $2\mathbf{Q}=\int(\mathrm{mv}^2)\mathbf{v}\mathrm{f}(\mathbf{r},\mathbf{v},\mathrm{t})\mathrm{d}^3\mathrm{v}$ $= \mathrm{nm}{<}\mathrm{v}{>}^2 <\mathrm{v}_i> + \mathrm{nm} < \delta\mathrm{v}^2 > <\mathrm{v}_i> + 2\ \mathrm{nm}< \delta\mathrm{v}_i\ \ \delta\mathrm{v}_j > <\mathrm{v}_j> +$ $\mathrm{nm}< \delta\mathrm{v}^2\delta\mathrm{v}_i >$. The first three terms on the right side represent the flow of macroscopic and internal energies carried by the average velocity $<\mathrm{v}_i>$. These terms vanish in the frame of reference moving with the average plasma velocity $<\mathrm{v}_i>$ (plasma frame). However, the last term, that represents thermal energy carried by fluctuation, need not vanish in the plasma frame. **Q** will give additional information about magnetopause processes important for determining if the transport process is dissipative. Examples from the cusp will be shown to highlight the important physics in the transport processes.