Discussion about Jun’s results

G. Wang

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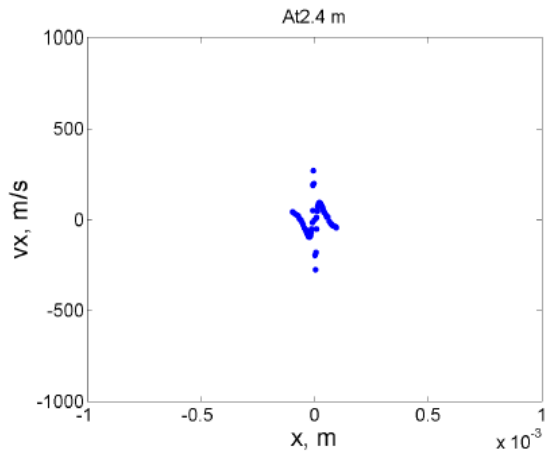
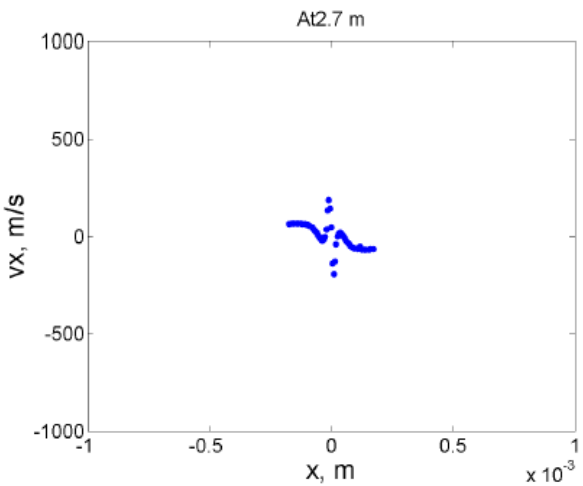
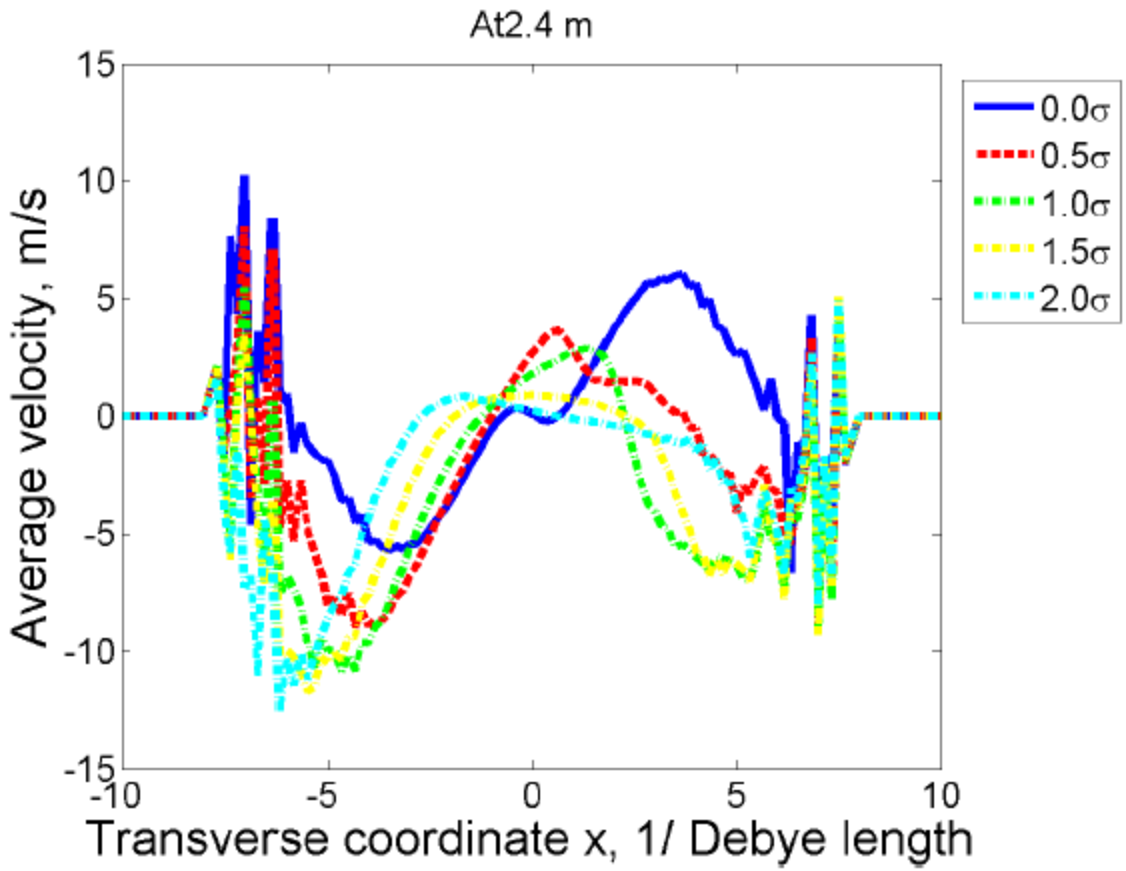


(b) With SC



(b) With SC



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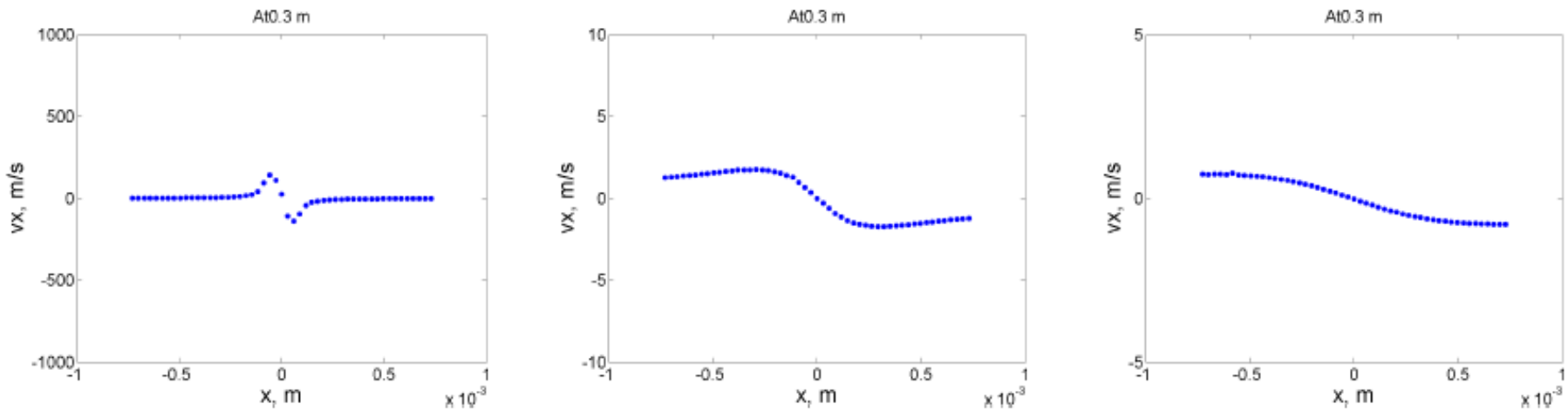


(a) $y = 0$ (b) $y = 0.5\sigma$ (c) $y = 1\sigma$

Formula for isotropic plasma with rest ion

Analytical results exists for electron plasma with kappa-2 isotropic velocity distribution

$$\beta_x = \beta_y = \beta_z = \overline{\beta} \qquad\qquad a = \frac{\overline{\beta}}{\omega_p}$$

$$\vec{j}_d\left(\vec{x},t\right) = \frac{-Z_i e\omega_p^2 a}{2\pi^2}\vec{x}\int_0^t d\tau\left\{\frac{2\sin\left(\omega_p\tau\right)}{\left(\overline{\beta}^2\tau^2+x^2\right)^2}+\frac{\cos\left(\omega_p\tau\right)}{x^2}\left[\frac{\omega_p\tau}{\overline{\beta}^2\tau^2+x^2}-\frac{\arctan\left(\frac{|x|}{\overline{\beta}\tau}\right)}{a|x|}\right]\right\}$$

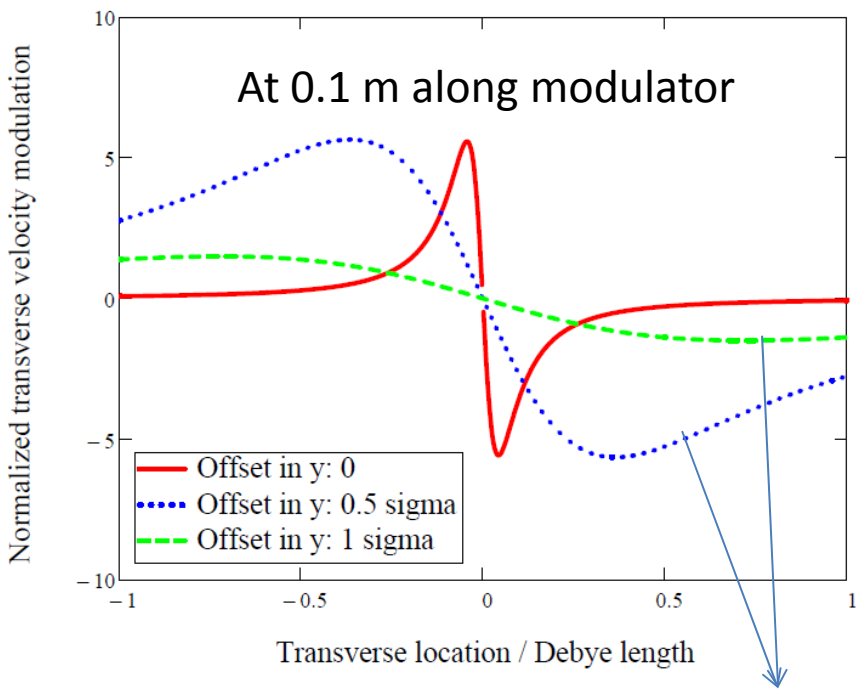
$$\left\langle v_x\right\rangle = \frac{j_{d,x}\left(x,y,t\right)}{n_0 e} = \frac{-2Z_i c}{\pi}\frac{c}{\overline{\beta}}\frac{r_e}{a}\overline{x}\int_0^{\omega_p t} d\tau\left\{\frac{2\sin\left(\tau\right)}{\left(\tau^2+\overline{x}^2+\overline{y}^2\right)^2}+\frac{\cos\left(\tau\right)}{\overline{x}^2+\overline{y}^2}\left[\frac{\tau}{\tau^2+\overline{x}^2+\overline{y}^2}-\frac{\arctan\left(\frac{\sqrt{\overline{x}^2+\overline{y}^2}}{\tau}\right)}{\sqrt{\overline{x}^2+\overline{y}^2}}\right]\right\}$$

Plots

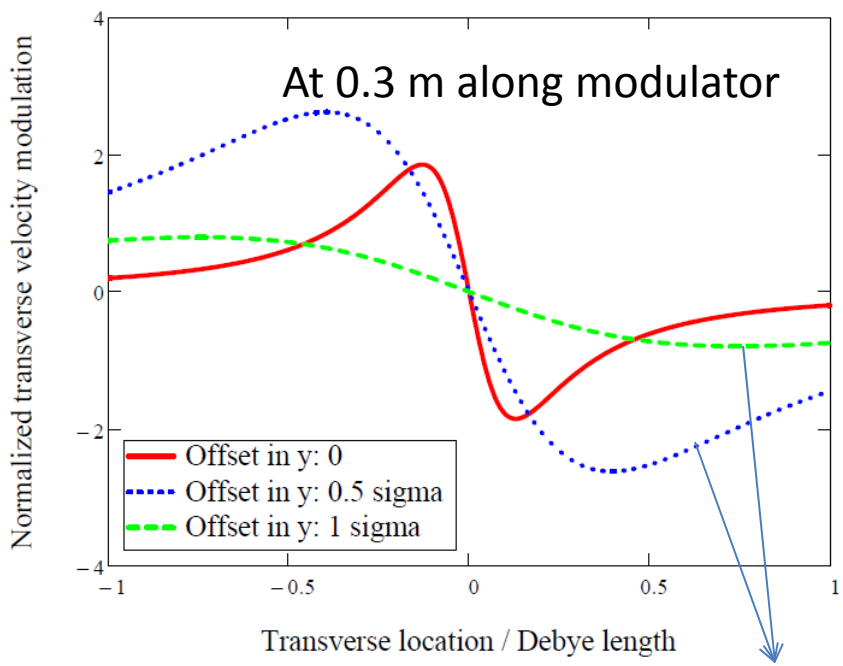
Normalization factor: $A = \frac{2Z_i}{\pi} \cdot \frac{c}{\bar{\beta}} \cdot \frac{r_e}{a}$

$$A_x = \frac{2Z_i}{\pi} \cdot \frac{c}{\beta_x} \cdot \frac{r_e}{a_x} = 18.6 \frac{m}{s} \qquad a_x = 340\mu m \qquad \beta_x = 2 \times 10^6 \frac{m}{s}$$

$$A_z = \frac{2Z_i}{\pi} \cdot \frac{c}{\beta_z} \cdot \frac{r_e}{a_z} = 1000 \frac{m}{s} \qquad a_z = 40\mu m \qquad \beta_z = 3 \times 10^5 \frac{m}{s}$$



Increased by a factor of 50



Increased by a factor of 10