Modulator simulations with open boundary and focusing field

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2016.3.3

Numerical setting

- Domain
  - Transversal : 4e-3m (14 $\times$ *Debyelength*) open boundary
  - Longitudinal : 2e-5m (20 $\times$ *Debyelength*) periodic boundary
- Grid number : 20 per Debye length
- Electron
  - Gaussian in x, y
  - Uniform in z
- Ion
  - At center
  - At one σ

Linear focusing field

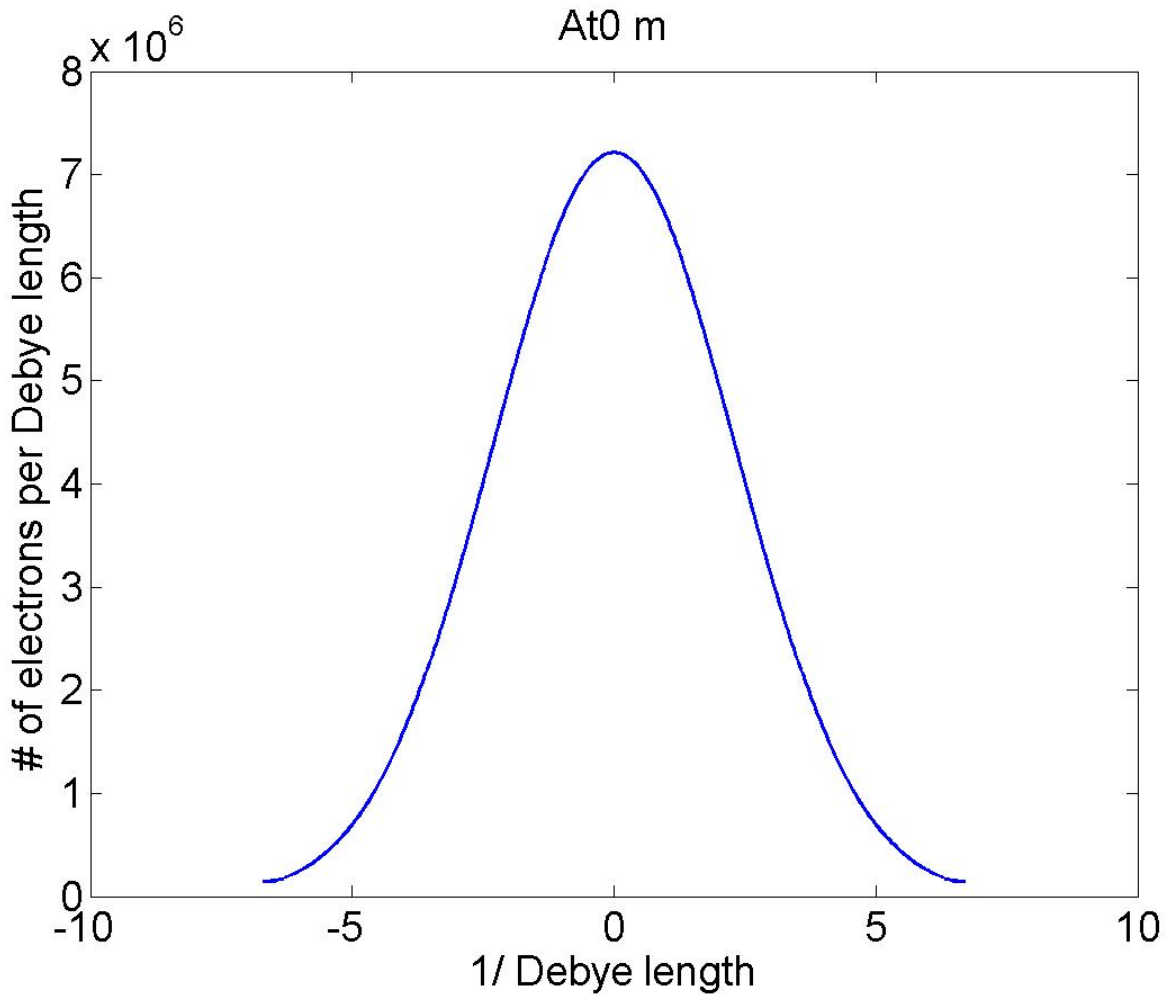
$$\vec{E}_0(x) = \frac{m_e}{e}\frac{\sigma^2}{r_0^2}(x - x_0)$$

G. Bell et al., VLASOV AND PIC SIMULATIONS OF A MODULATOR SECTION FOR COHERENT ELECTRON COOLING, Proceedings of 2011 Particle Accelerator Conference, New York, NY, USA, MOP067.

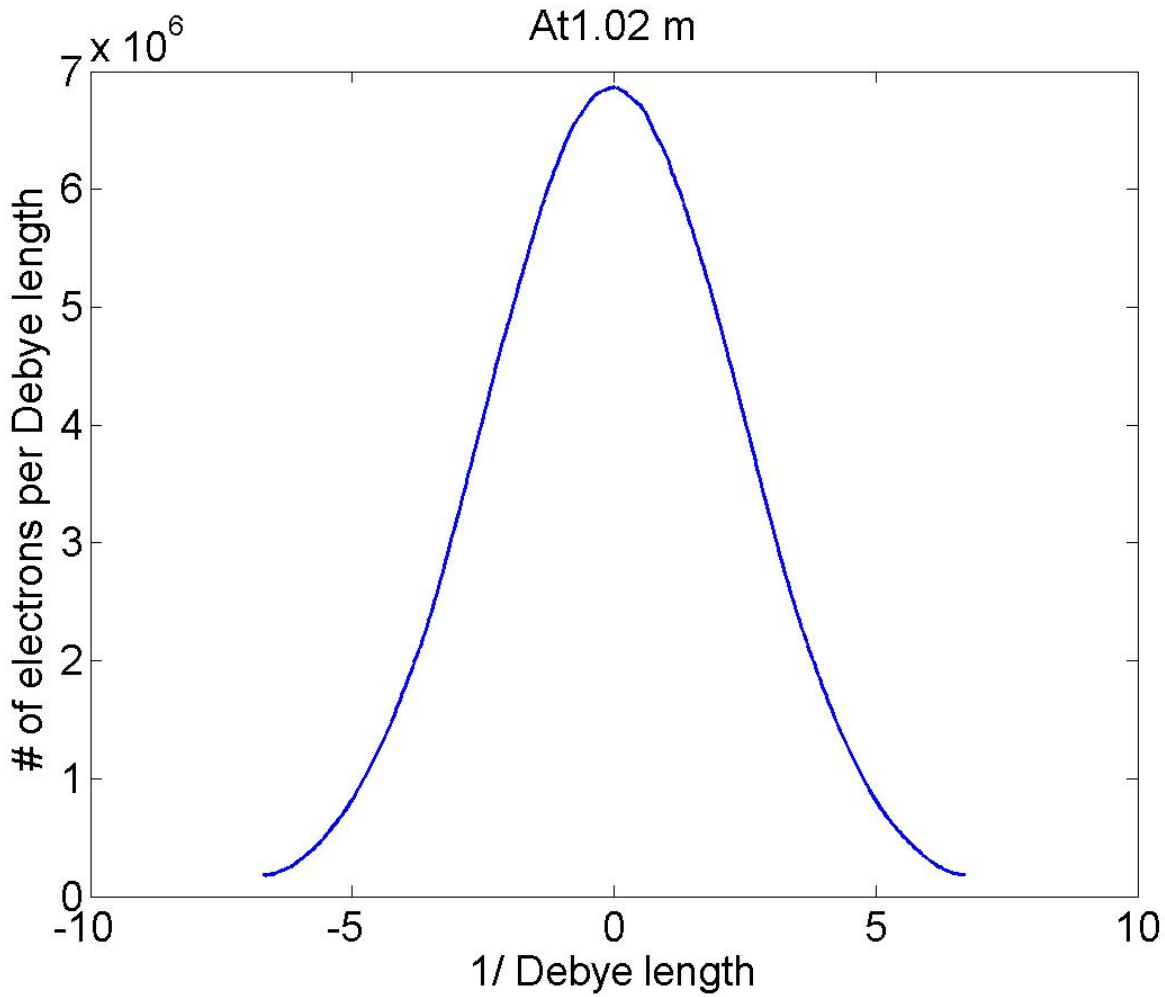
Implemented as

$$\vec{E} = k\vec{x}$$

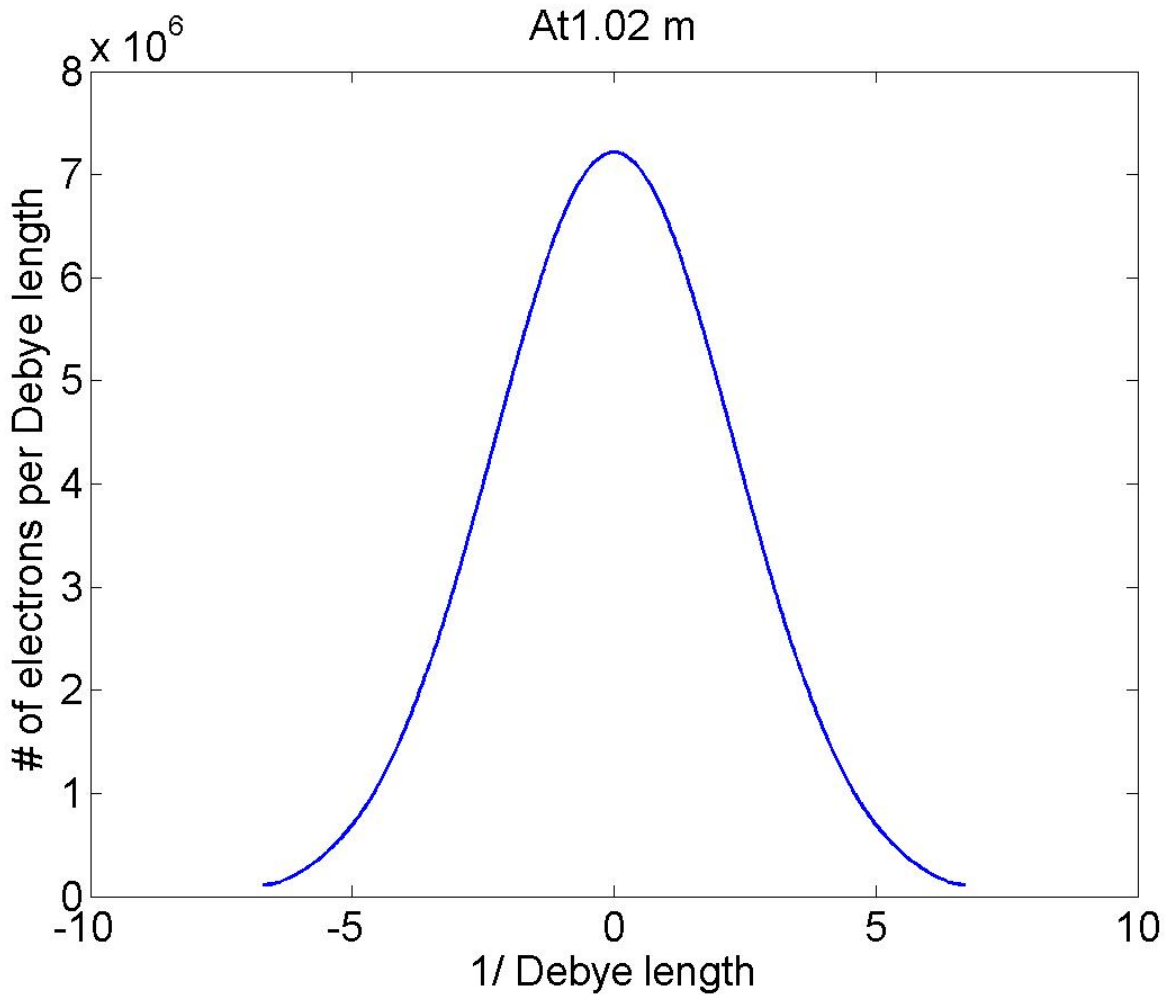
Transversal number distribution, initial



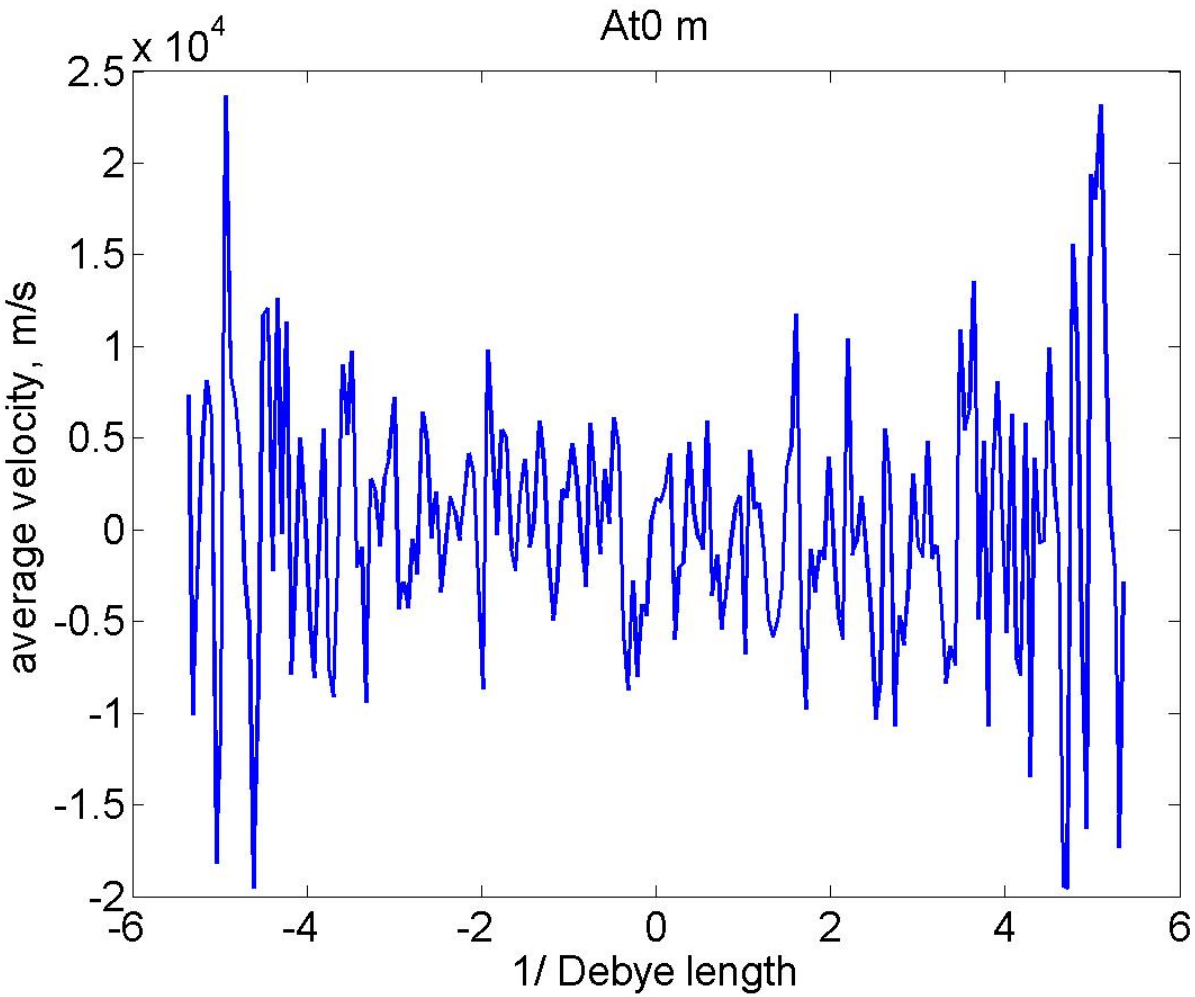
Transversal number distribution, without focusing field



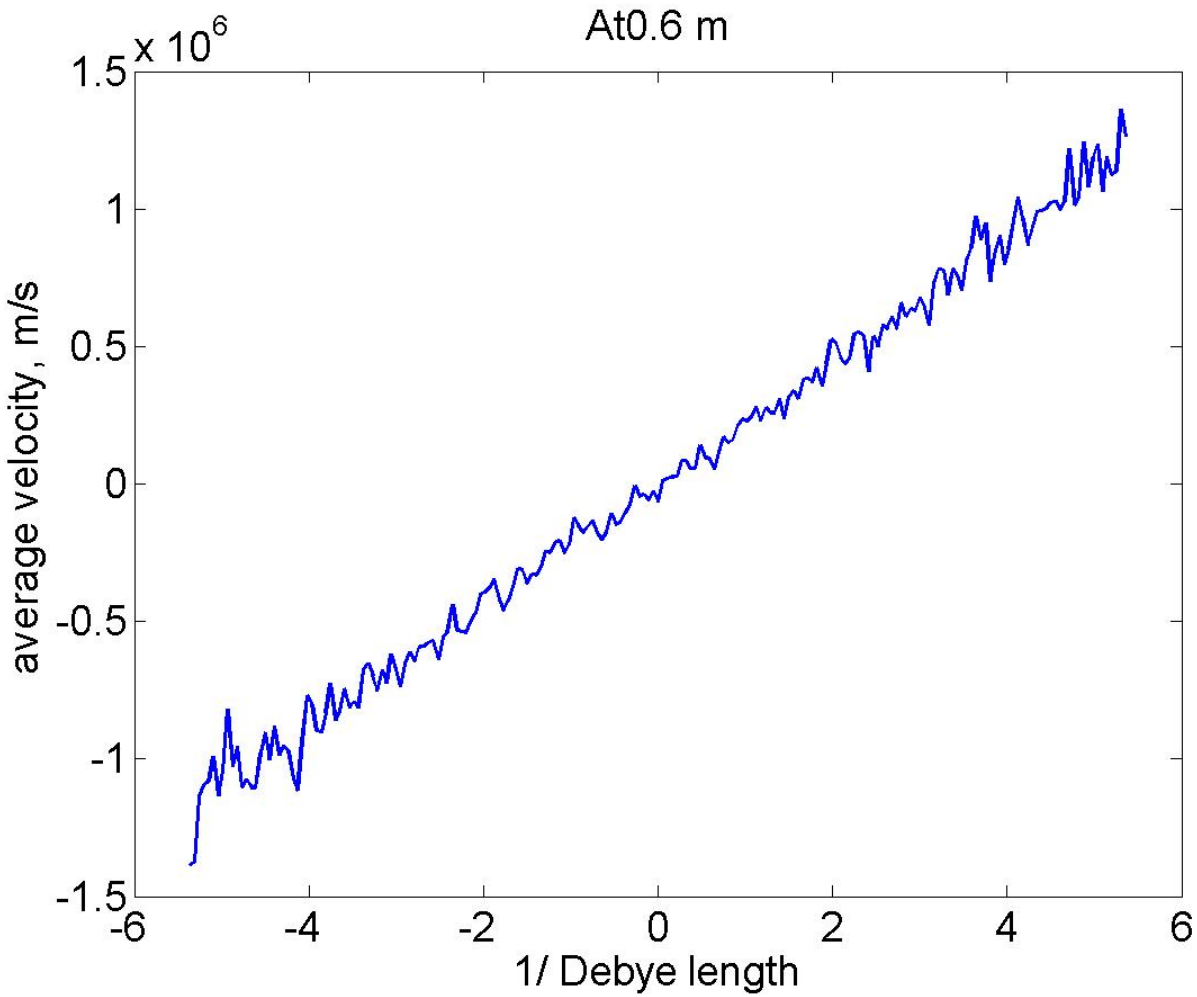
Transversal number distribution, with focusing field



Transversal velocity distribution, initial



Transversal velocity distribution, without focusing field



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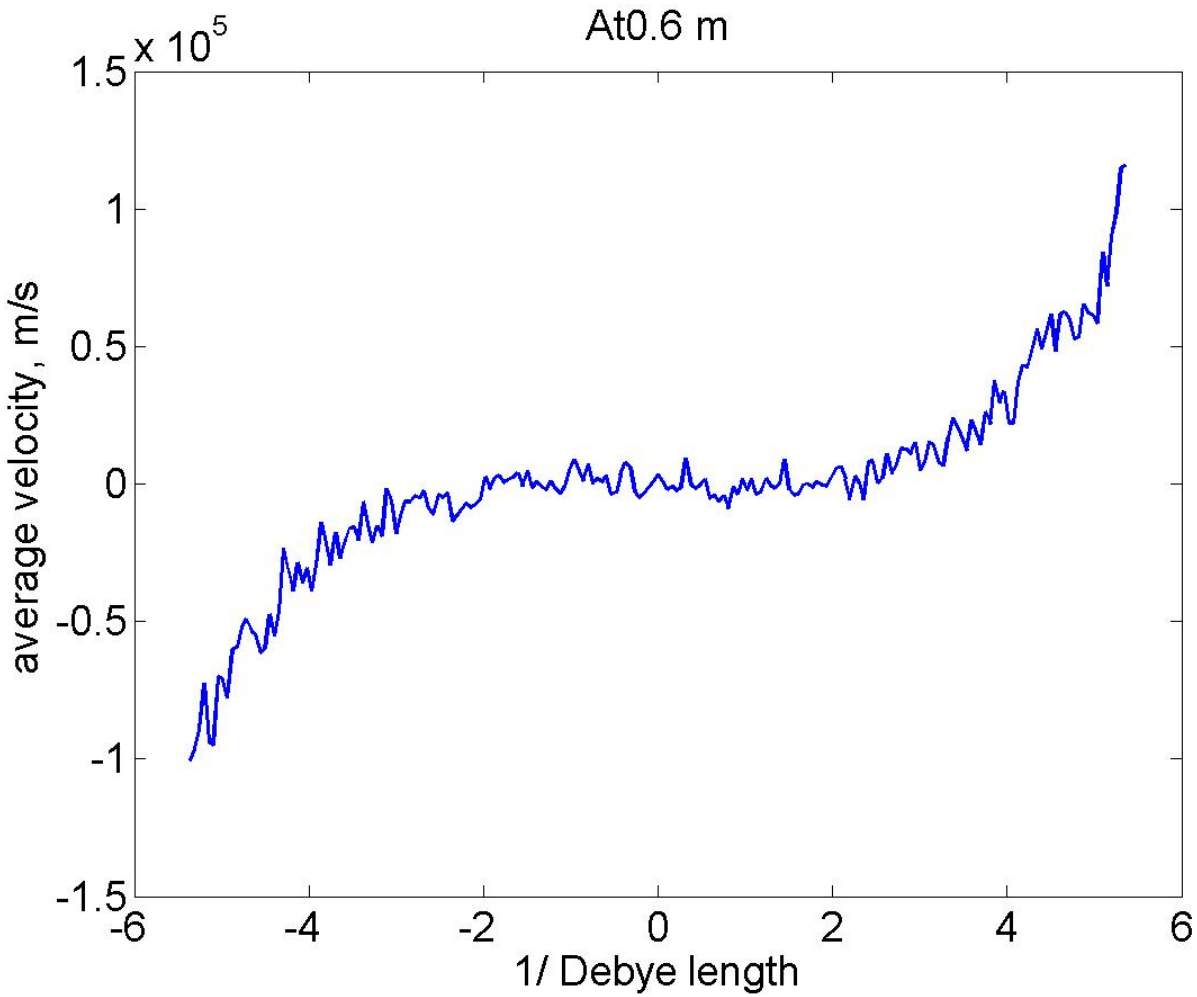
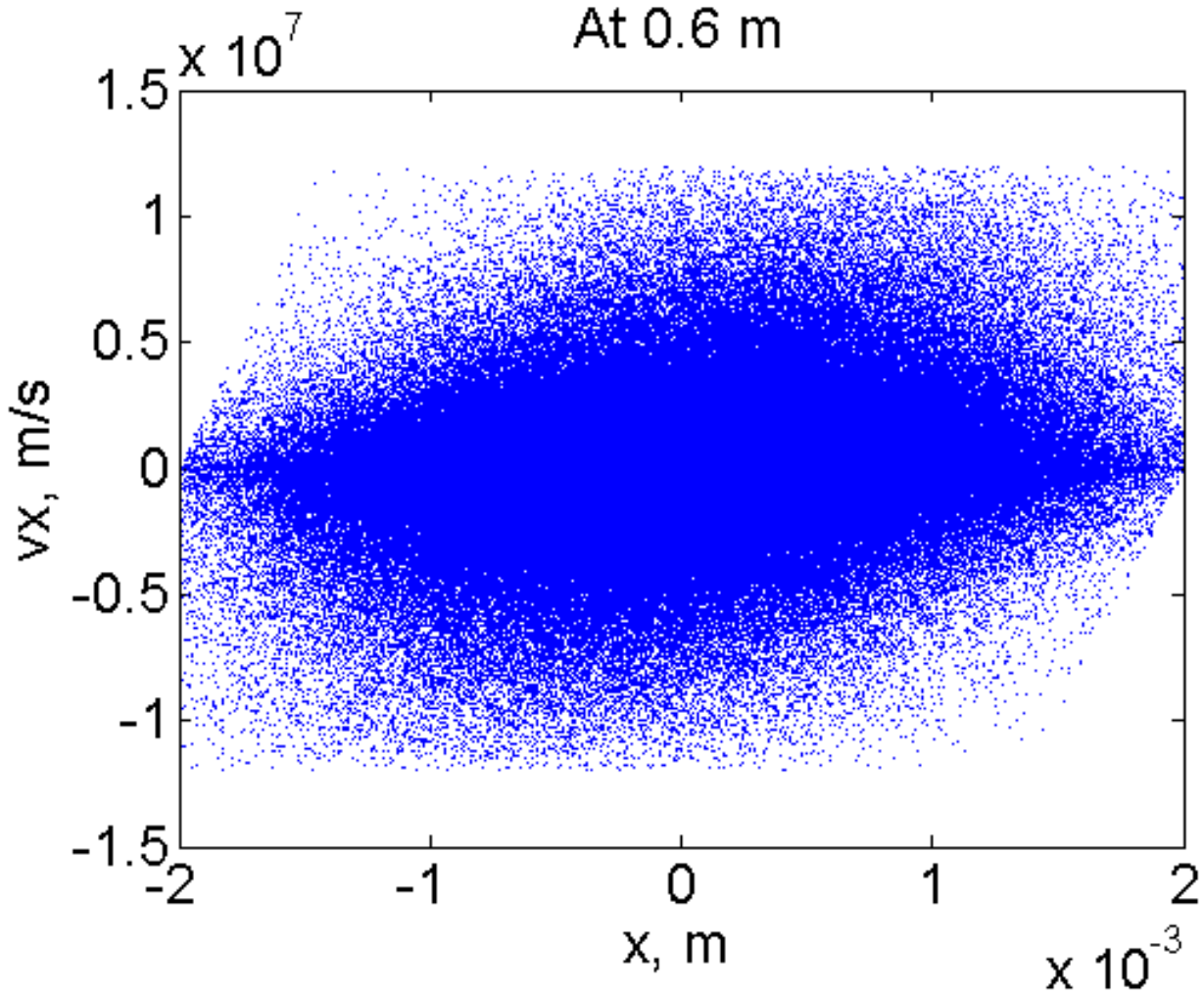
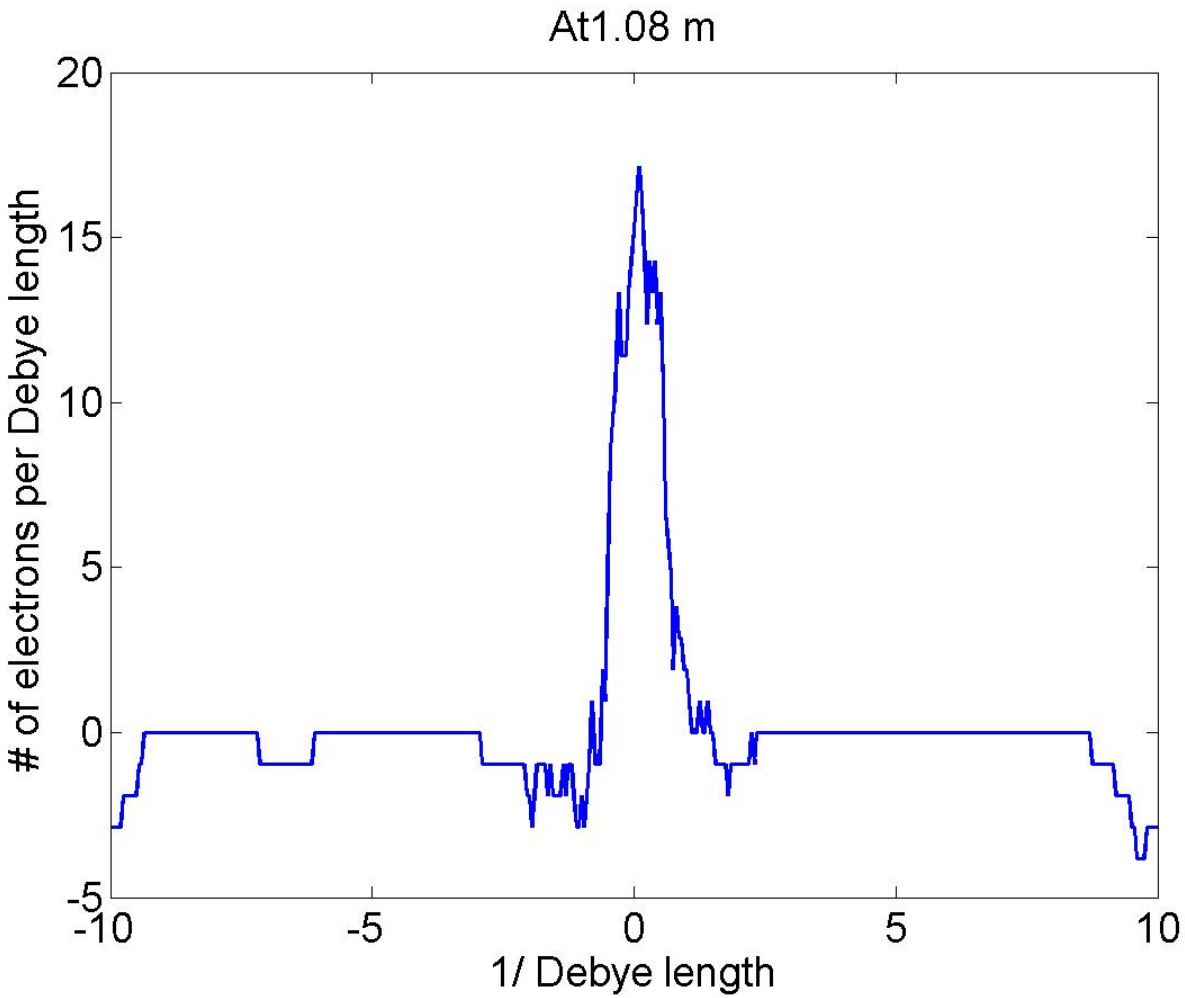


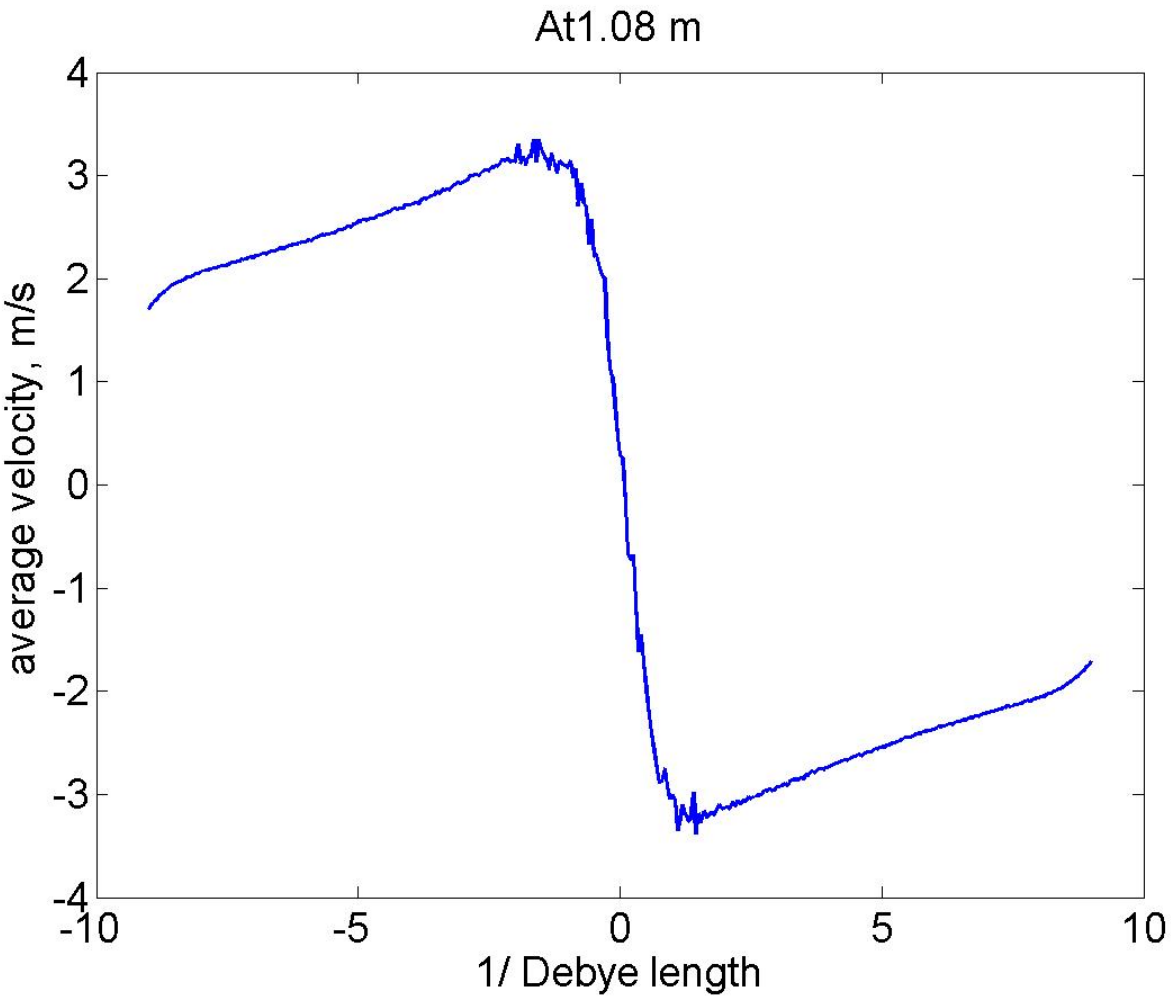
Transversal velocity distribution, without focusing field



Longitudinal number distribution



Longitudinal velocity distribution



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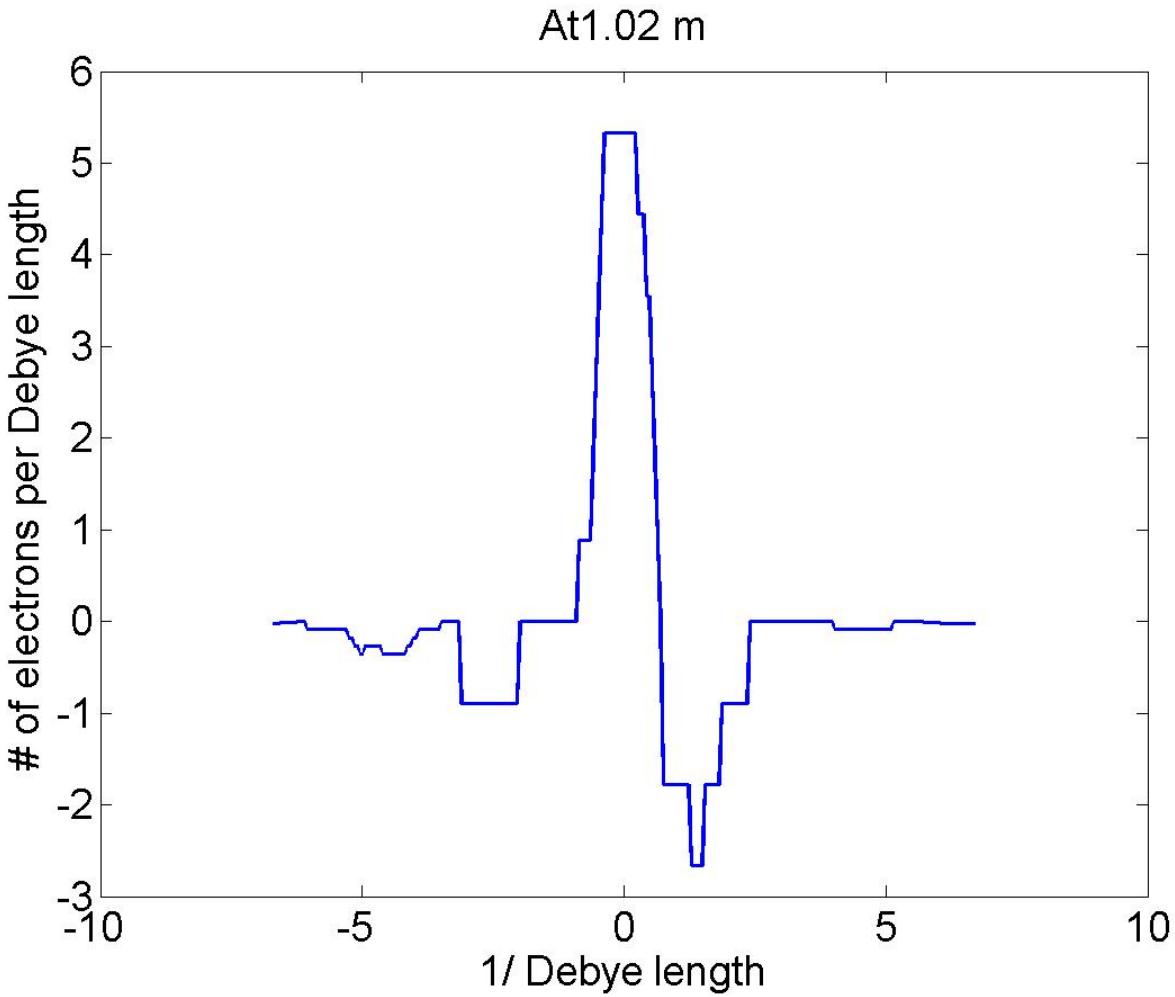

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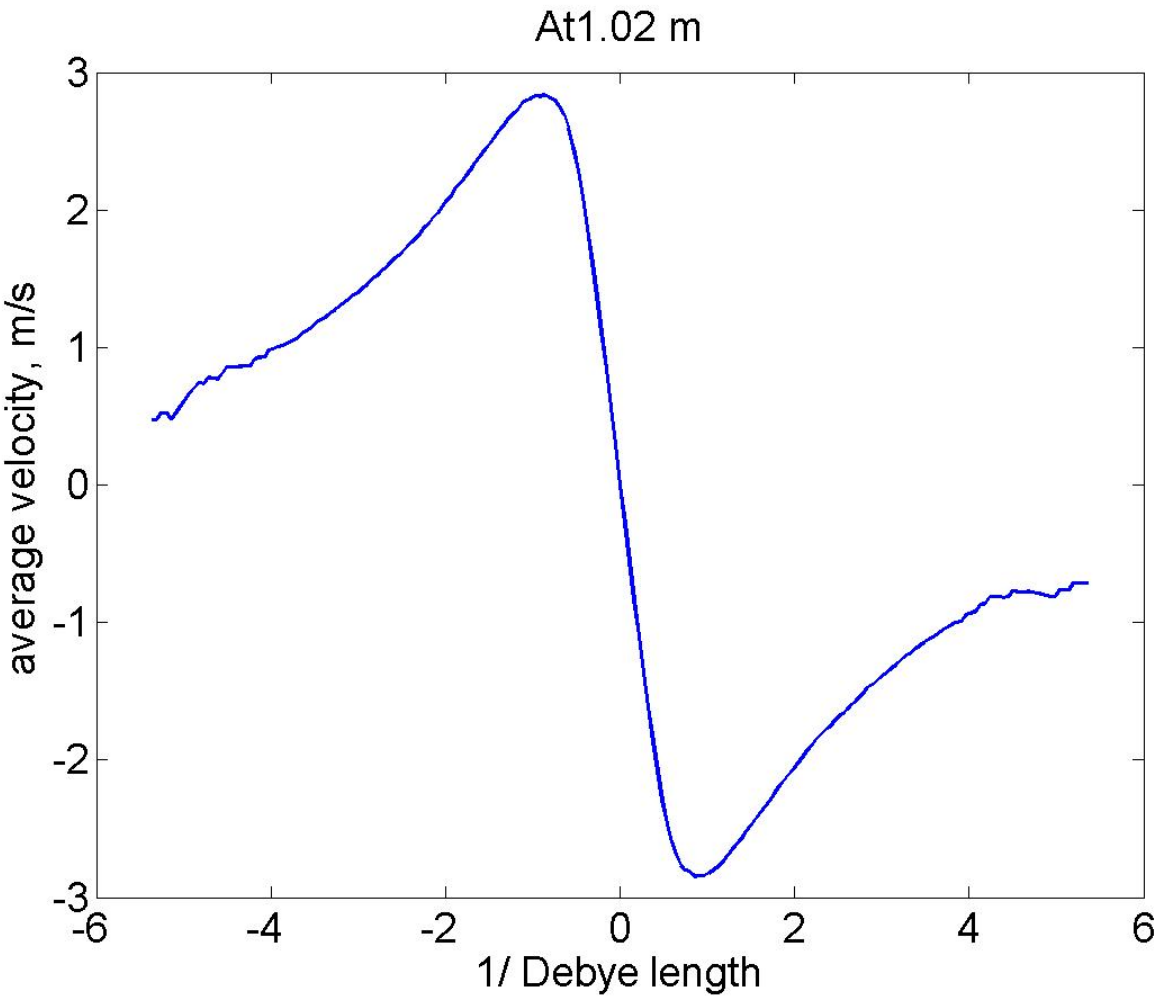

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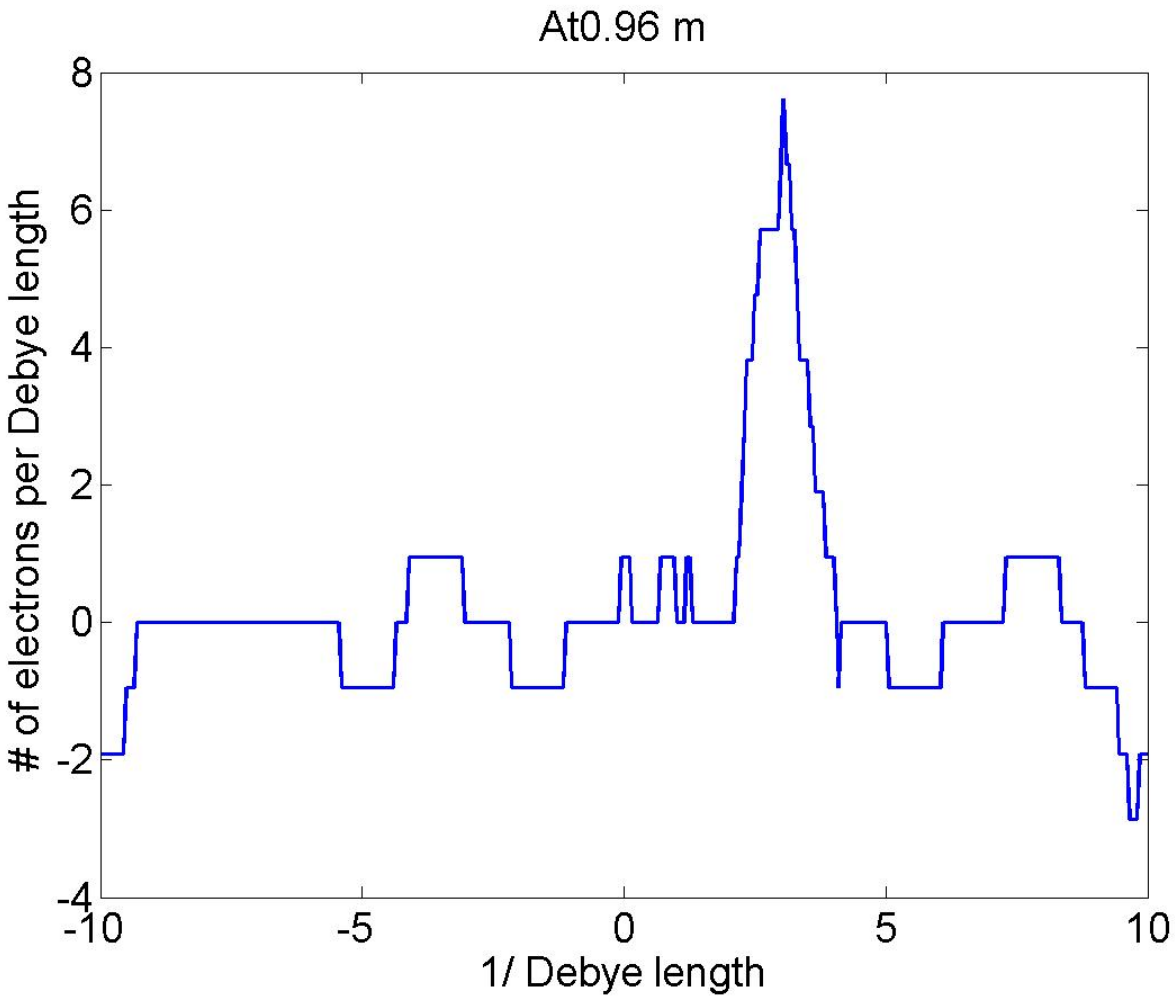

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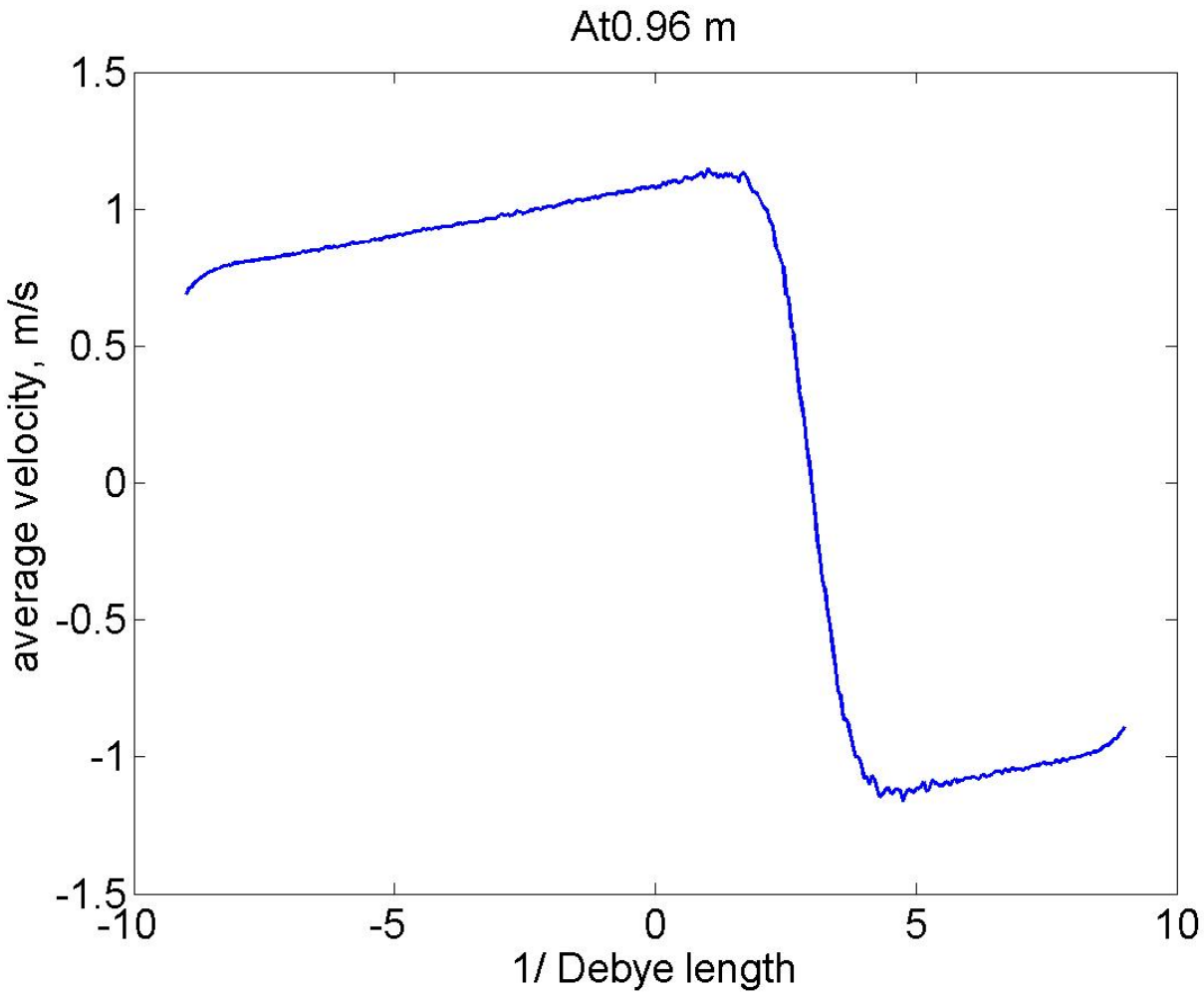

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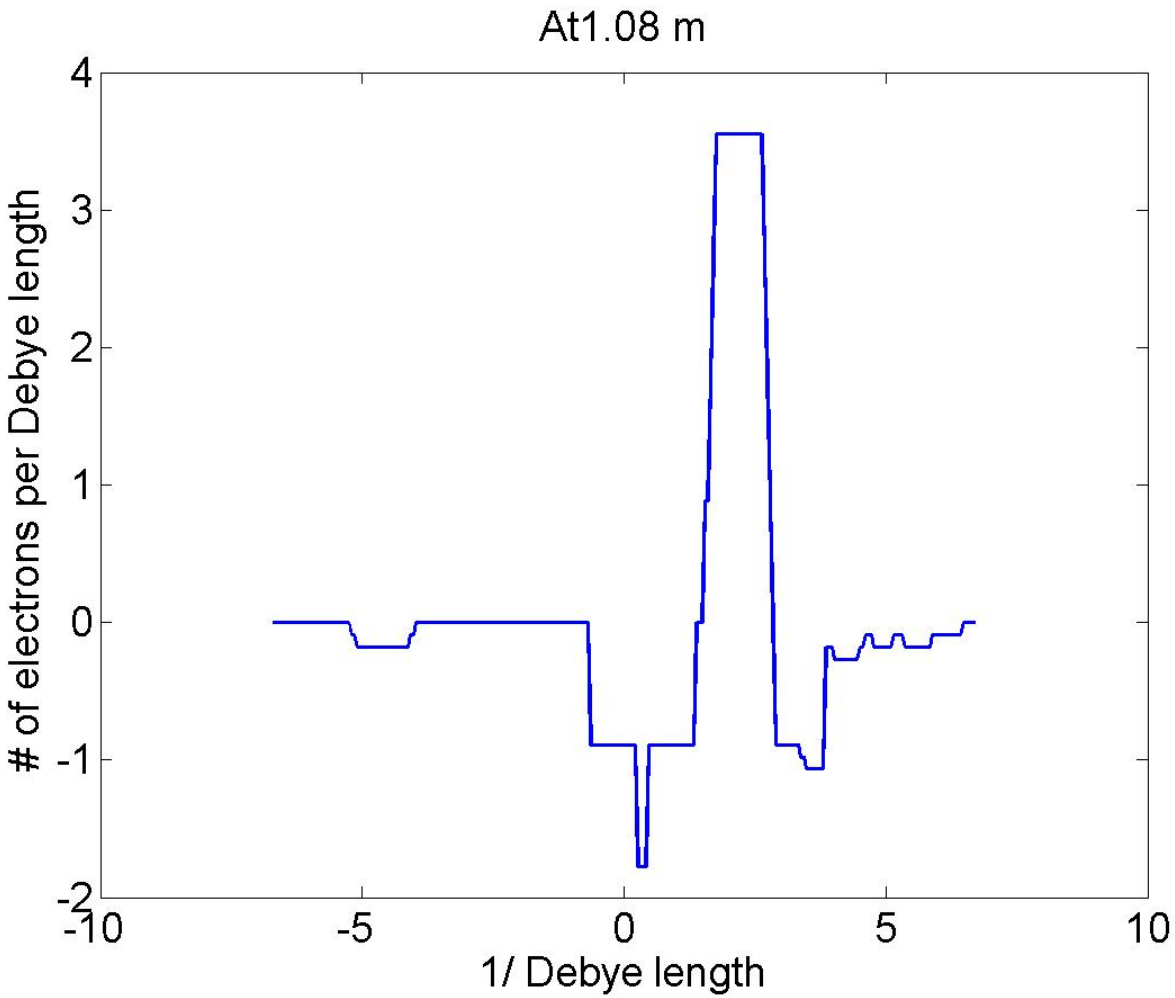
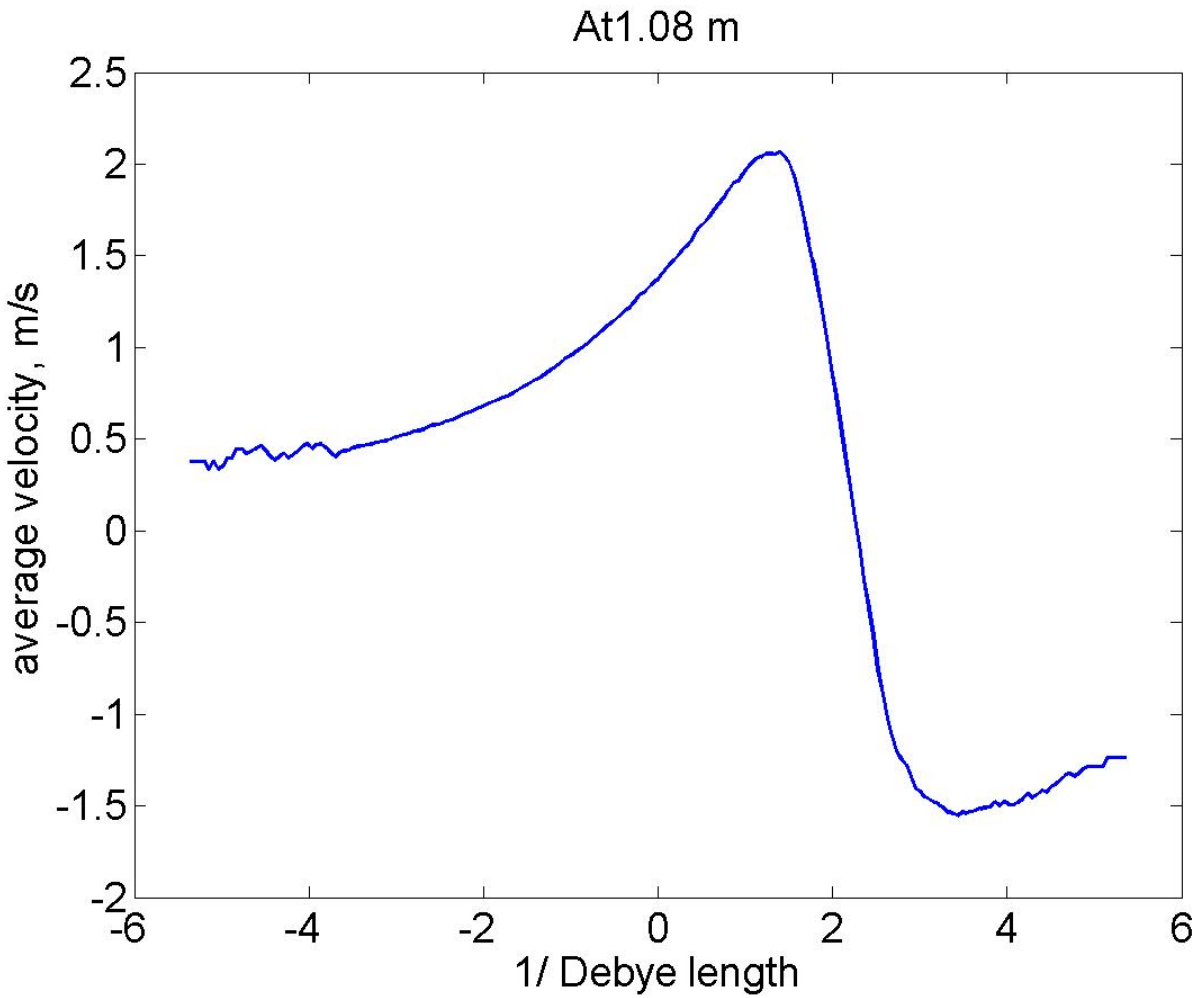
Transversal velocity distribution