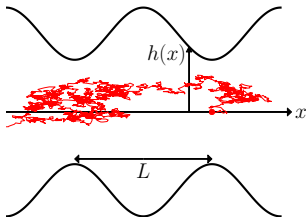


## Dispersion in periodic channels

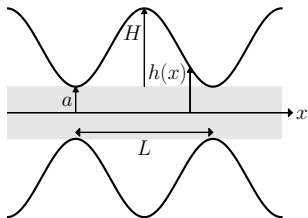
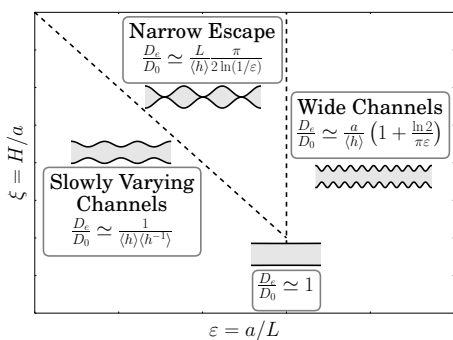
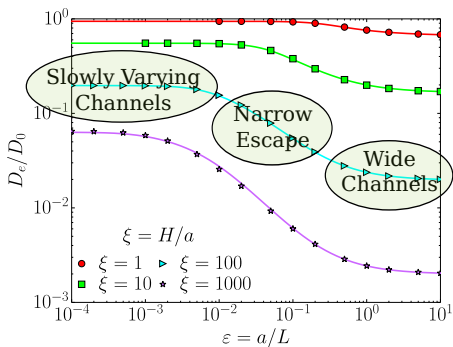
Matthieu Mangeat, Thomas Guérin and David S. Dean

Laboratoire Ondes et Matière d'Aquitaine, Université de Bordeaux

How to characterize the dispersion of small particles into channels ?



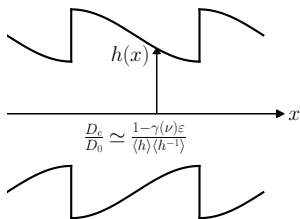
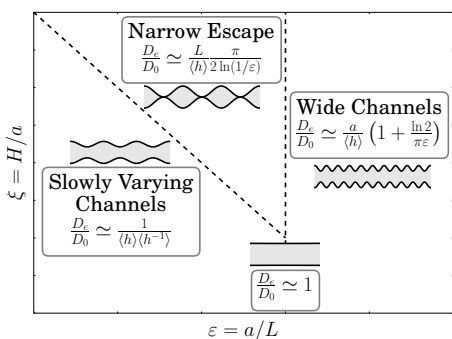
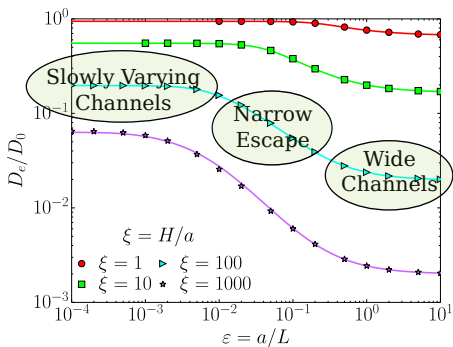
- ▶ Long-time effective diffusivity
  - ▶  $D_e = \lim_{t \rightarrow \infty} \frac{\langle x^2(t) \rangle}{2t} < D_0.$
- ▶ Entropic trapping of particles (Fick-Jacobs)
  - ▶ marginal probability  $p(x) \propto h(x).$
  - ▶ effective entropy  $s(x) = \ln h(x).$
  - ▶  $\frac{D_e}{D_0} \simeq \frac{1}{\langle h \rangle \langle h^{-1} \rangle}, h'(x) \ll 1.$



- ▶ Three regimes of dispersion.
- ▶ The 1d-reduction approximation is verified for slowly varying channels.
- ▶ Universal constant found for wide channels.
- ▶ Geometry controlled dispersion in channels.

[1] M. Mangeat, T. Guérin and D. S. Dean, EPL **118**, 40004 (2017).

[2] M. Mangeat, T. Guérin and D. S. Dean, J. Stat. Mech. (2017) 123205.



- ▶ Three regimes of dispersion.
- ▶ The 1d-reduction approximation is verified for slowly varying channels.
- ▶ Universal constant found for wide channels.
- ▶ Geometry controlled dispersion in channels.
- ▶ Generalization to discontinuous channels.

[1] M. Mangeat, T. Guérin and D. S. Dean, EPL **118**, 40004 (2017).

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Thank you for your attention!