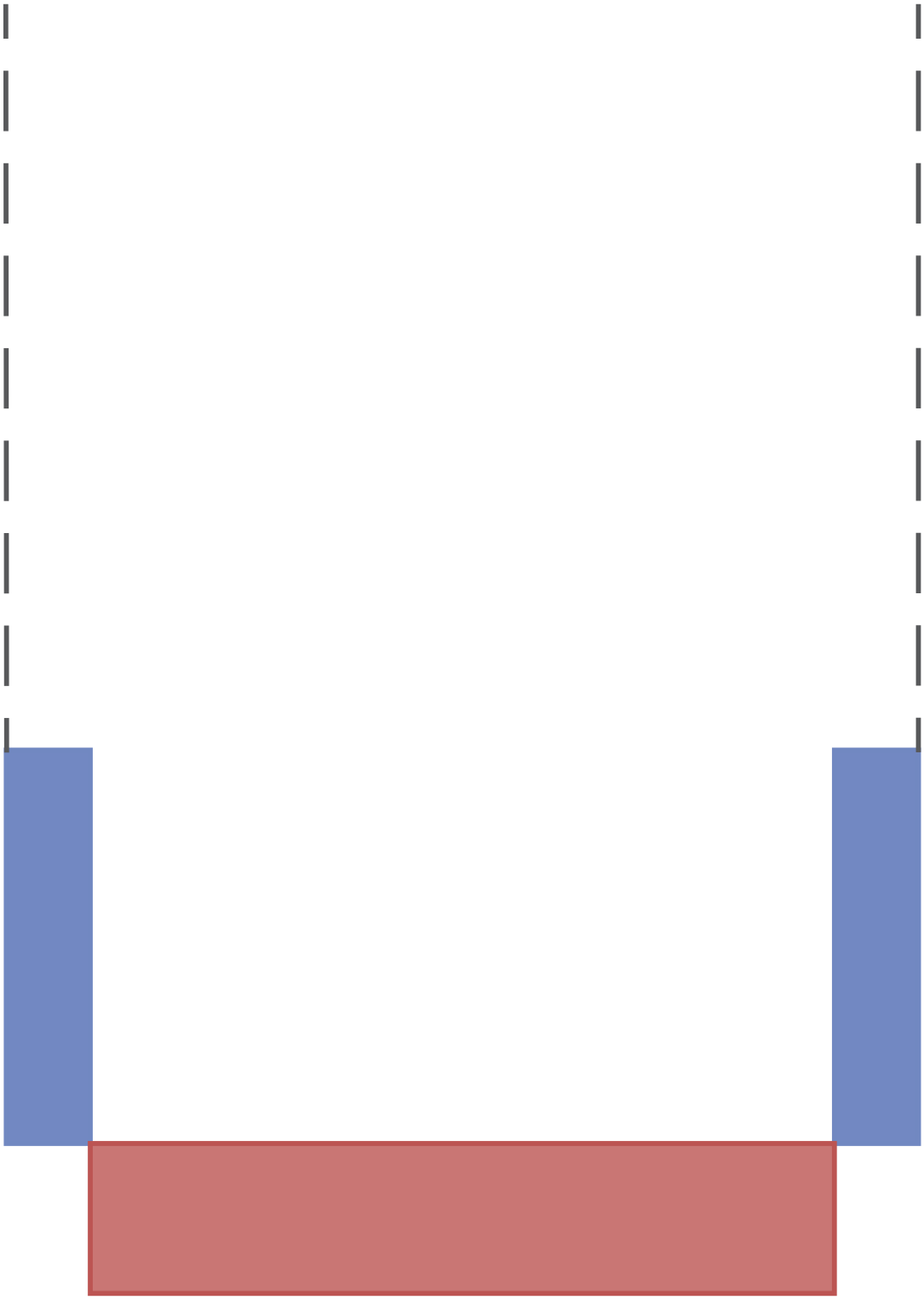

Photo-elastic (pe) vs. moving boundary (mb)

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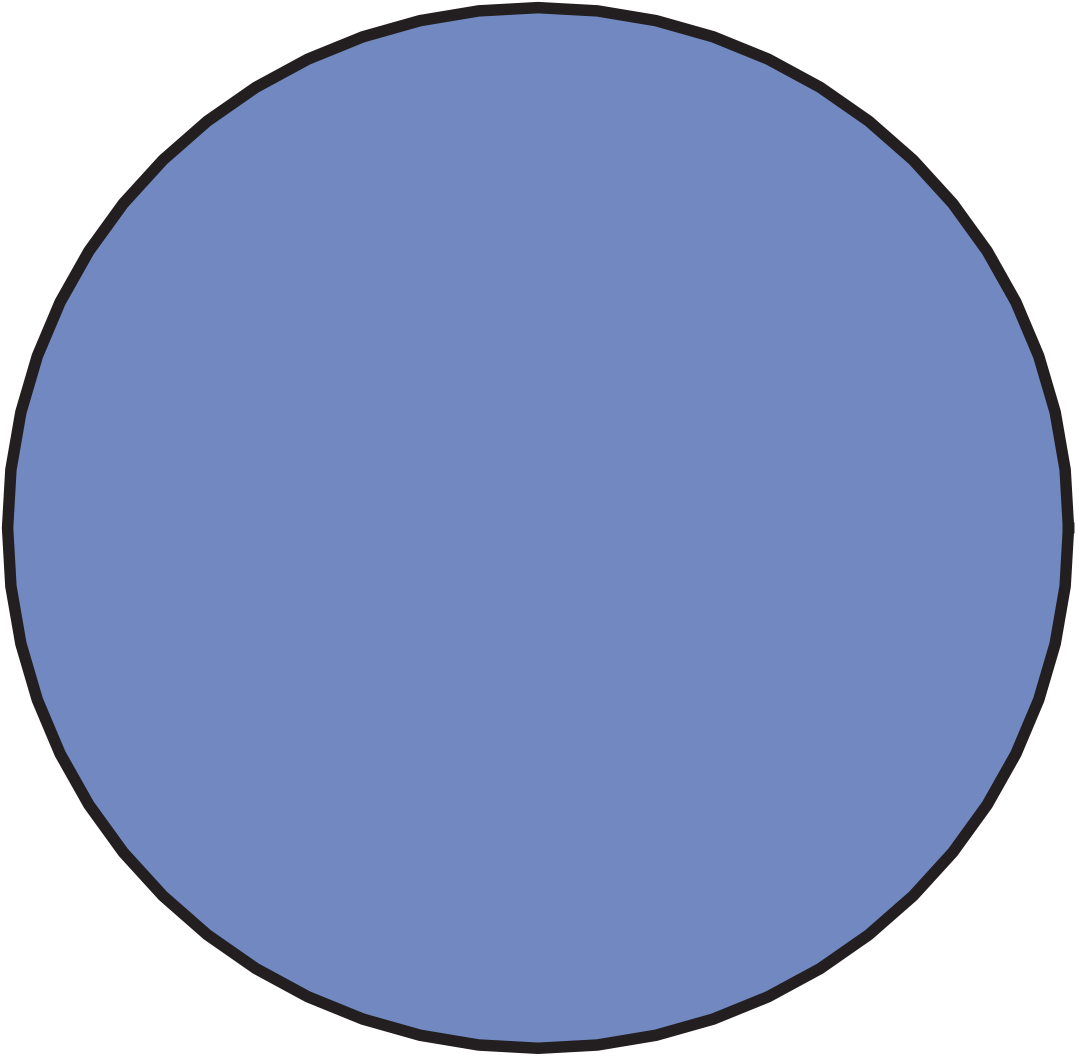
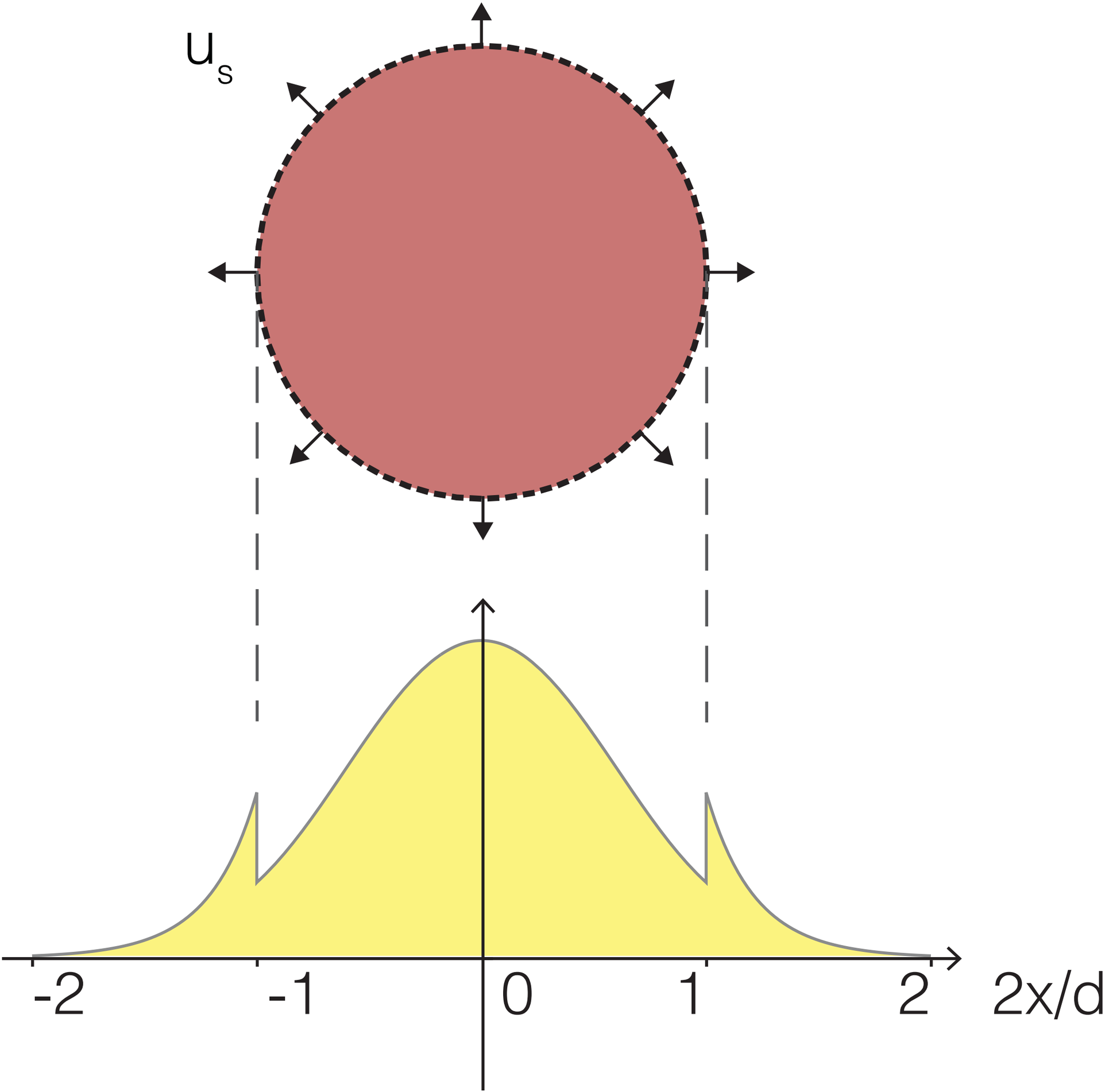
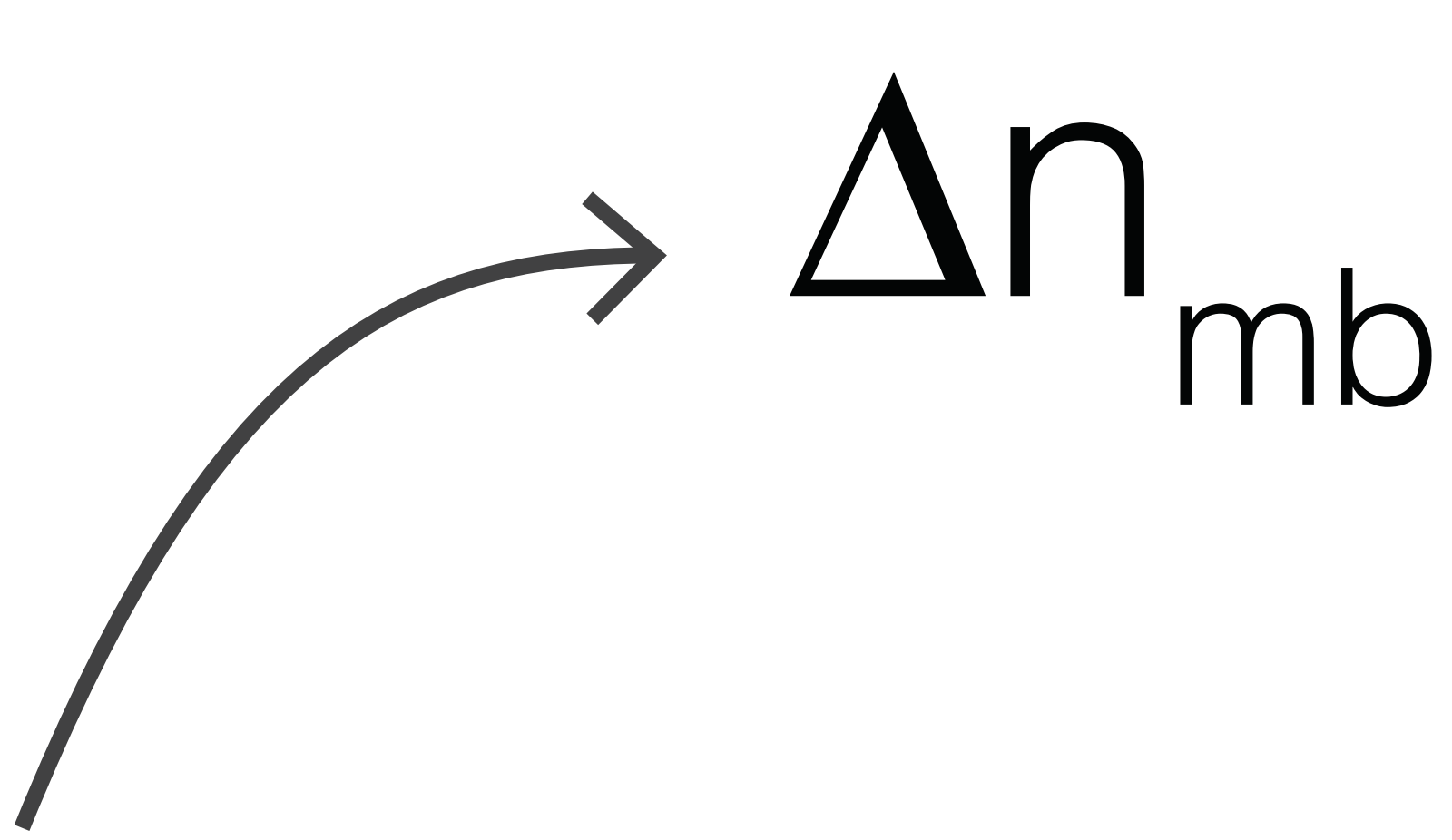
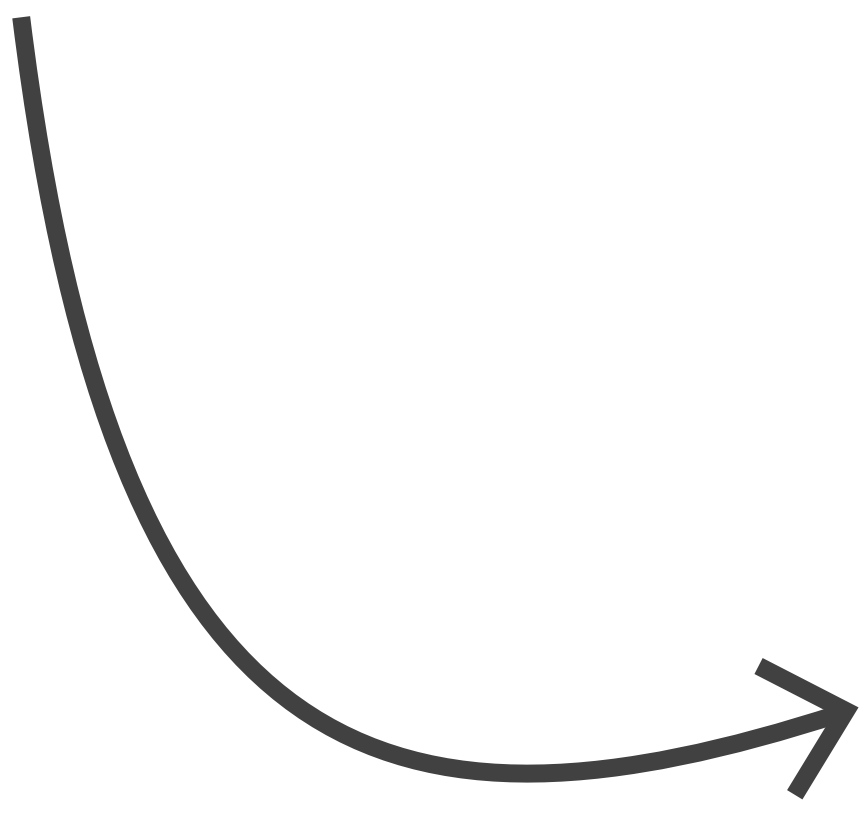
Wombat 2022, Erlangen, June 14th 2022. Gustavo Wiederhecker.




u_s
-2
-1
0
1
2
2x/d

O. Florez et al. “Brillouin scattering self-cancellation,” Nat Comms, vol. 7, p. 11759, (2016).


Δn_{mb}



Δn_{pe}

$$u_r = (2r/d)u_s$$

$$S_{rr} = \partial_r u_r = 2u_s / d$$

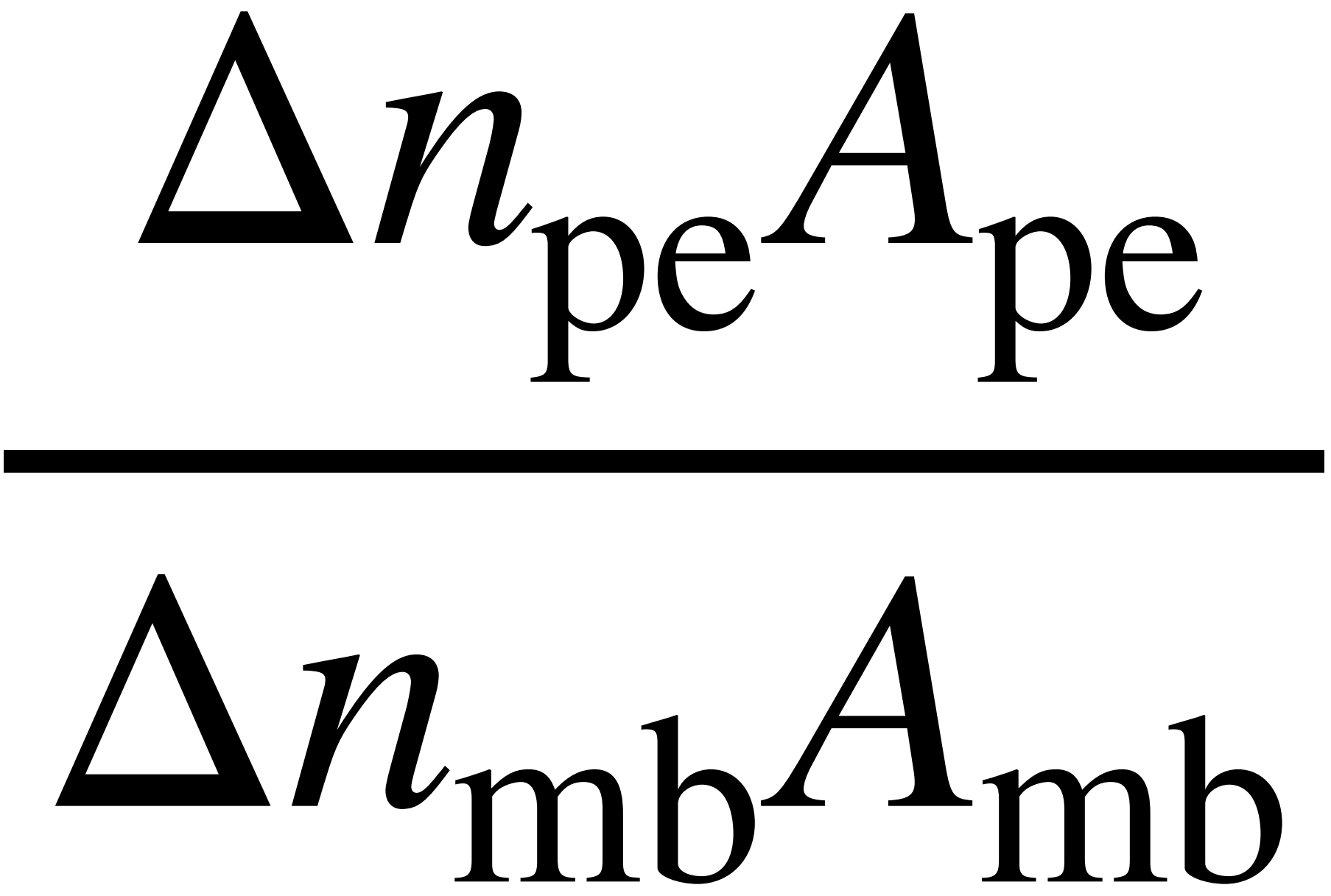
$$\Delta\epsilon_{\mathrm{pe}} = 2n\Delta n_{\mathrm{pe}} = -n^4 p_{11} S_r$$

$$\Rightarrow \Delta n_{\mathrm{pe}} = -n^3 p_{11} \frac{u_s}{d}$$

$$\Delta n_{\mathrm{mb}} = n_{\mathrm{glass}} - n_{\mathrm{air}}$$

$$A_{\mathrm{mb}} = \pi u_s d$$

$$A_{\mathrm{pe}} = \pi d^2/4$$


$\frac{\Delta n_{\mathrm{pe}} A_{\mathrm{pe}}}{\Delta n_{\mathrm{mb}} A_{\mathrm{mb}}}$

$$\frac{\Delta n_{\mathrm{pe}} A_{\mathrm{pe}}}{\Delta n_{\mathrm{mb}} A_{\mathrm{mb}}} = \frac{-n^3 p_{11}}{4\Delta n_{\mathrm{mb}}} \approx -0.2$$

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O. Florez et al. “Brillouin scattering self-cancellation,” Nat Comms, vol. 7, p. 11759, (2016).