Dynamics of an isolated valve

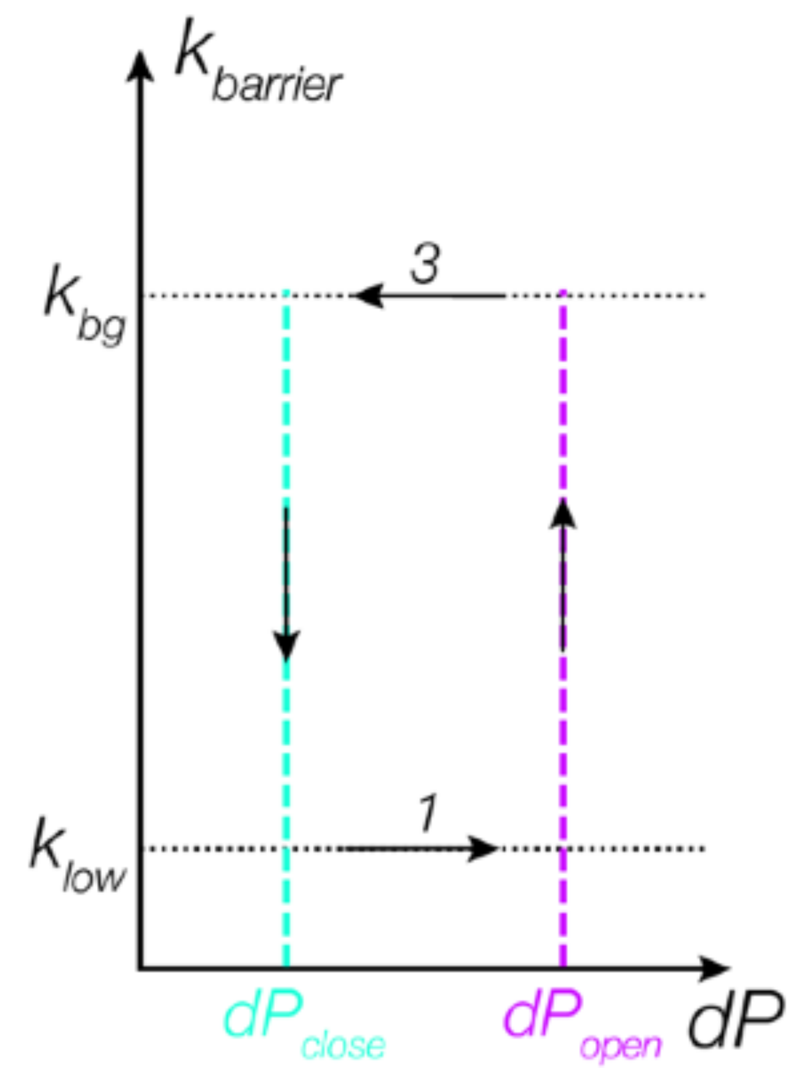
(a) Experimental setup

In our model, a valve is described by its width *w_b*, its permeability *k_b*, and finally by its opening and closing conditions, which depend on the pressure differential *dP* across the valve:

*dP_open = dpdx_opening * w_b*
*dP_close = dpdx_closing * w_b*

In this experimental set up, *dpdx_open* (*dpdx_hi*), *dpdx_close* (*dpdx_lo*) and *w_b* vary, and *k_b* is fixed at *1e-3 * k_bg*.

The runs are conducted in both fixed pressure and fixed flux boundary conditions.



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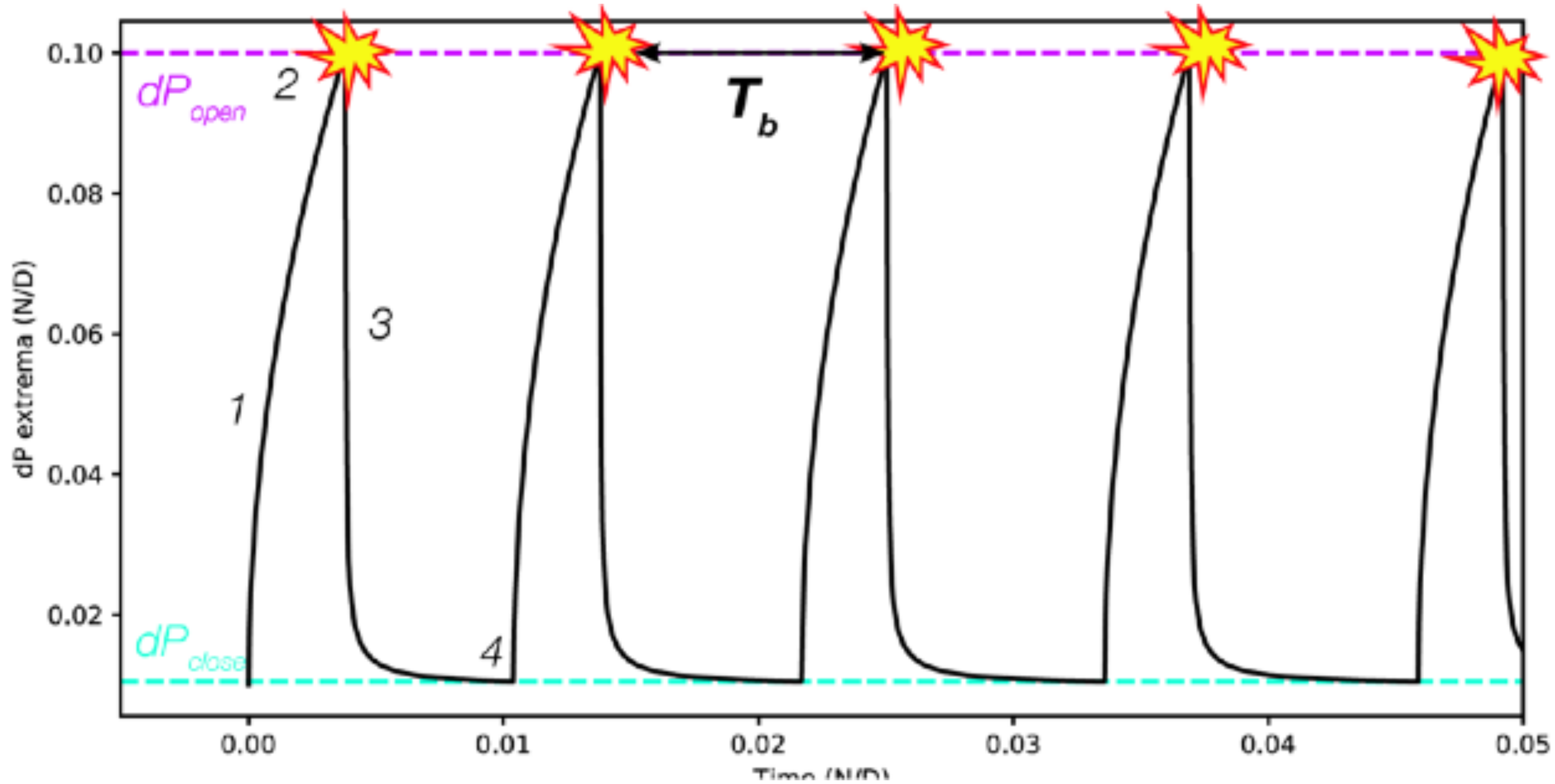

In order to understand the valve dynamics, cycle characteristic times are measured (loading and unloading periods) for a set of opening/closing thresholds and widths.

Each run lasts 2*T_scale, during which we measure the first loading (*resp.* unloading) dt, the last loading (*resp.* unloading) dt, and the time at which the measure is stabilized.