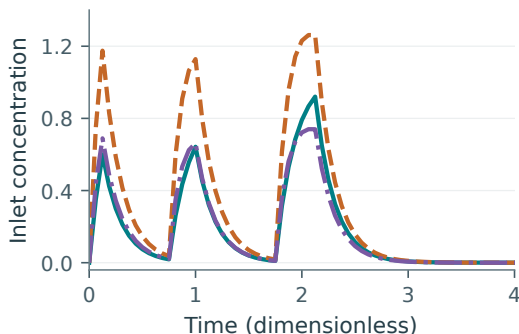


Delivery history changes what reaction rates appear to mean

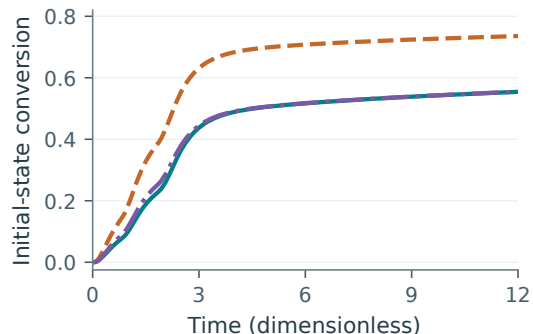
ALD half-reaction model | Original dimensionless synthetic study

— Single pole - - - Buffer: same command - · - · Buffer: equal total dose

(a) Unseen short-pulse inlet

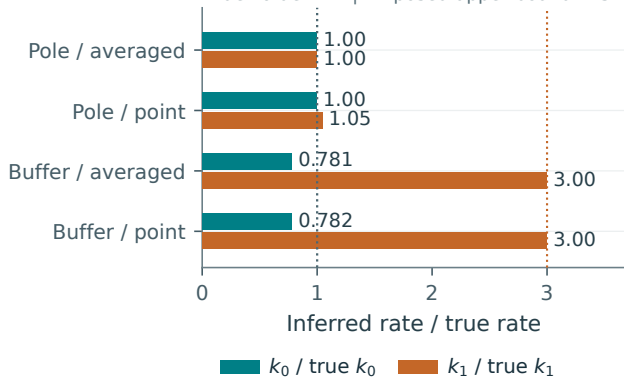


(b) Surface-state response

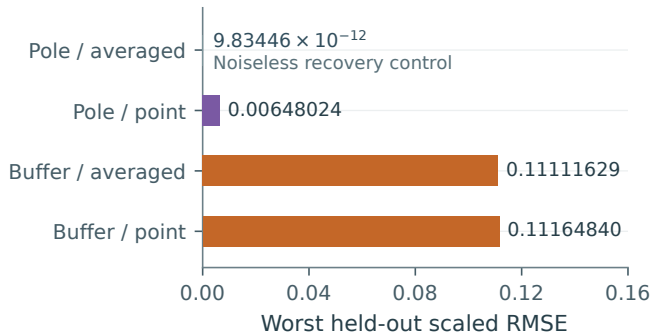


(c) Training-only rate inference

True value = 1 | Imposed upper bound = 3



(d) Held-out model error



Linear scale; same two unseen histories

Numerically verified model; no measured calibration. Conversion is not film thickness or growth per cycle.

Rate bars at 3 reach the imposed bound. No confidence intervals estimated. Curves join saved samples without smoothing.