

**Shear dynamics of confined membranes:  
Electronic Supplementary Information**

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## Supplementary Movies

The movies show the simulation results for the dynamics of membrane-height profiles (topviews along the  $Z$  direction) with excess area  $\Delta A_*$  and under the shear velocity  $V$ . The steady-state membrane profiles may drift with velocity  $(V_{dX}, V_{dY})$  along the  $(X, Y)$  directions.

**Supplementary Movie 1** – This movie is cited in the text as  $\text{ESI}^\dagger(\textit{Movie 1})$  and has the file name “sm1”. This shows the simulation results for  $V = 0$  and for six values of  $\Delta A_*$ : 0.007495, 0.01186, 0.05999, 0.1503, 0.2462, 0.4062.

**Supplementary Movie 2** – This movie is cited in the text as  $\text{ESI}^\dagger(\textit{Movie 2})$  and has the file name “sm2”. This shows the simulation results for cases which steady-state membrane profiles drift to the right  $V_{dX} > 0$  for six values of  $(\Delta A_*, V)$ : (0.007495, 1), (0.01186, 0.1), (0.1503, 1), (0.1503, 2), (0.1503, 20), (0.2462, 20).

**Supplementary Movie 3** – This movie is cited in the text as  $\text{ESI}^\dagger(\textit{Movie 3})$  and has the file name “sm3”. This shows the simulation results for cases which steady-state membrane profiles drift to the left  $V_{dX} < 0$  for four values of  $(\Delta A_*, V)$ : (0.05999, 5), (0.1503, 2), (0.1503, 30), (0.2462, 5). Note that here the simulation for  $(\Delta A_*, V)=(0.1503, 2)$  has different initial condition with that in Supplementary Movie 2.

**Supplementary Movie 4** – This movie is cited in the text as  $\text{ESI}^\dagger(\textit{Movie 4})$  and has the file name “sm4”. This shows the simulation results for cases which steady-state membrane profiles are frozen  $V_{dX} = V_{dY} = 0$  for two values of  $(\Delta A_*, V)$ : (0.05999, 20), (0.2462, 10).

**Supplementary Movie 5** – This movie is cited in the text as  $\text{ESI}^\dagger(\textit{Movie 5})$  and has the file name “sm5”. This shows the simulation results for the case which the steady-state membrane profile oscillates along the  $X$  direction  $\Delta A_* = 0.1503$  and  $V = 3$ .

**Supplementary Movie 6** – This movie is cited in the text as  $\text{ESI}^\dagger(\textit{Movie 6})$  and has the file name “sm6”. This shows the simulation results for large shear  $V = V_{\max}$  which steady-state membrane profiles are periodic for three values of  $(\Delta A_*, V)$ : (0.007495, 5), (0.01186, 5), (0.1503, 80).

**Supplementary Movie 7** – This movie is cited in the text as  $\text{ESI}^\dagger(\textit{Movie 7})$  and has the file name “sm7”. This shows the simulation results for large membrane  $\Delta A_* = 4.0735$  for seven values of  $V$ : 0, 20, 40, 50, 80, 120, 150.