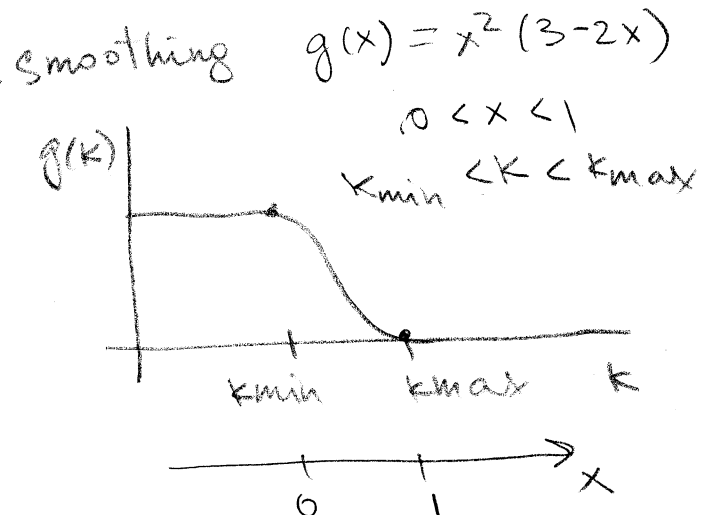
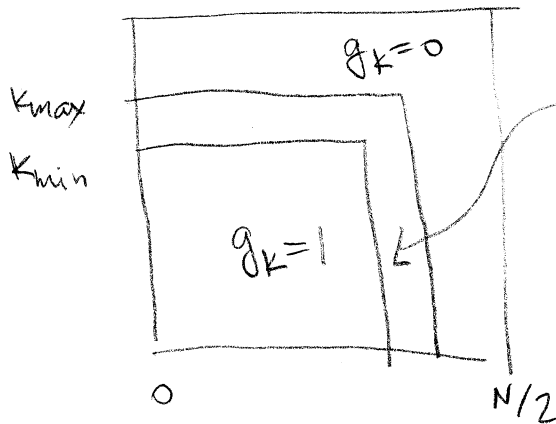


Forcing and dealiasing

Dealiasing zeros out high frequency modes after each linear step

$$\hat{\Psi}_k := g_k \hat{\Psi}_k$$

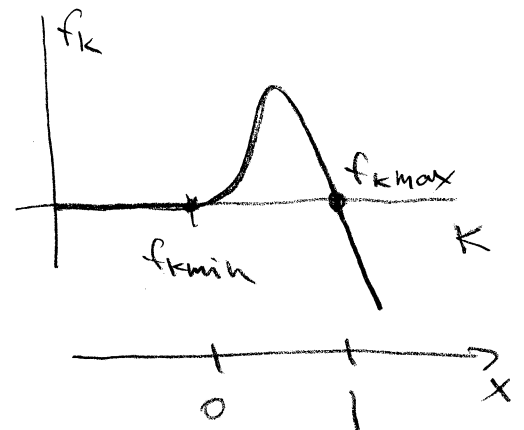
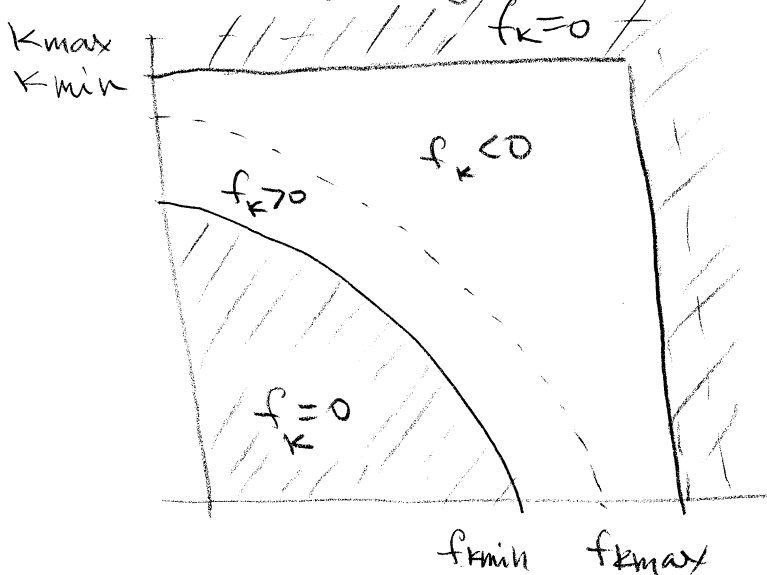


Forcing: amplify or dampen modes

$$\frac{d}{dt} \hat{\Psi}_k = f_k \hat{\Psi}_k$$

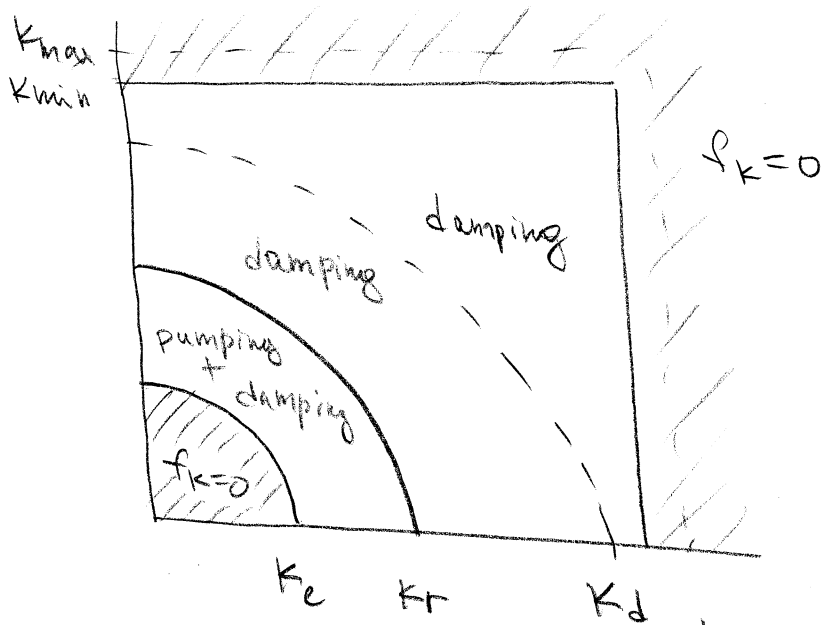
(1) $f_k = \text{const} = b$

(2) hi-frequency forcing



$$f_k = 4x^2(1-x^2)$$

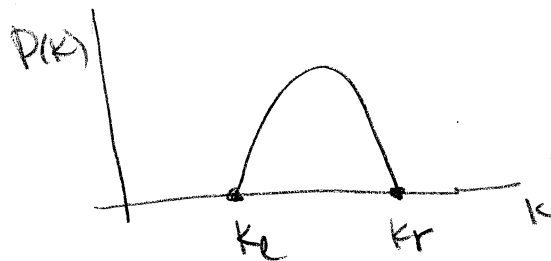
(3) Dyachenko-Falkovich (1996) forcing



$$f_k = P(k) - d(k)$$

pumping:

$$P(k) = \alpha \sqrt{(k^2 - k_e^2)(k_r^2 - k^2)}$$



damping:

$$d(k) = \beta k^2 \gamma\left(\frac{k}{k_d}\right)$$

$$\gamma(x) = \begin{cases} \frac{1}{6} x^5 \exp[5(1-x^2)], & x < 1 \\ 1 - \frac{5}{6} \exp[\frac{1}{2}(1-x^2)], & x > 1 \end{cases}$$

