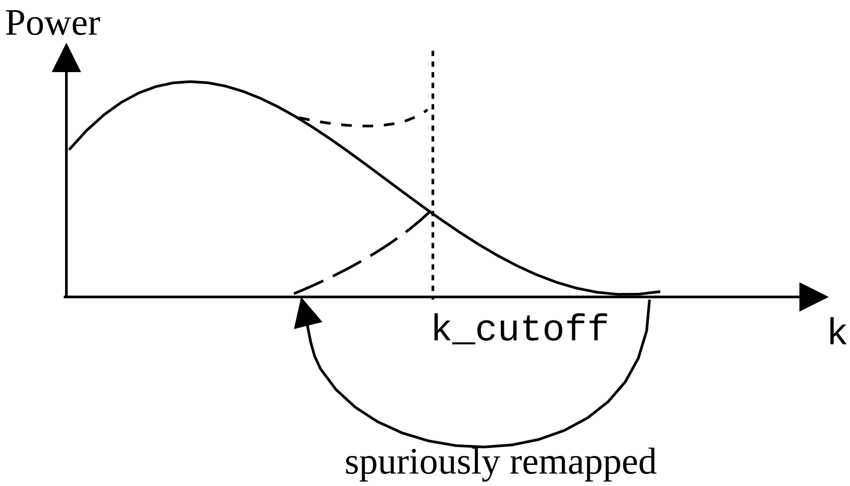
PARALLEL CODE: DEALIASING

If the signal to be Fourier−transformed is band−width−limited, and you use a discrete transform that encompasses the band, then the result is exact.

If the signal had power outside the range of the transform, then the missing frequencies are ALIASED back into the range of the transform.



`k_cutoff` −−− max retained frequency

Nonlinear interactions produce frequencies up to −−− `2*k_cutoff`

Spurious frequencies folded back −−− `k_cutoff` maps to itself
`2*k_cutoff` maps to zero

`(k_cutoff+k)` maps to `(k_cutoff−k)`

`k_dealias − 2/3*k_cutoff`

Zero out all `k > k_dealias`

Now nonlinear terms produce k's up to `2*k_dealias = 4/3*k_cutoff`

`[k_cutoff:(4/3*k_cutoff)]` is aliased into `[2/3*k_cutoff:k_cutoff]`

and we are ZEROING out this bit!

i.e. if we only keep the first 2/3 of the frequencies, they remain UNCONTAMINATED by aliasing errors.

BIG ADVANTAGE:

If we only keep the wavenumbers up to `k_dealias`, then we save 1/3 of the memory and the communication.

In 2D, we are doing only 2/3*2/3 = 4/9 < 1/2 of the work!