

Wave Packet Velocity

Here we'll explore the difference between the "phase velocity" and the "group velocity" of a wave-packet.

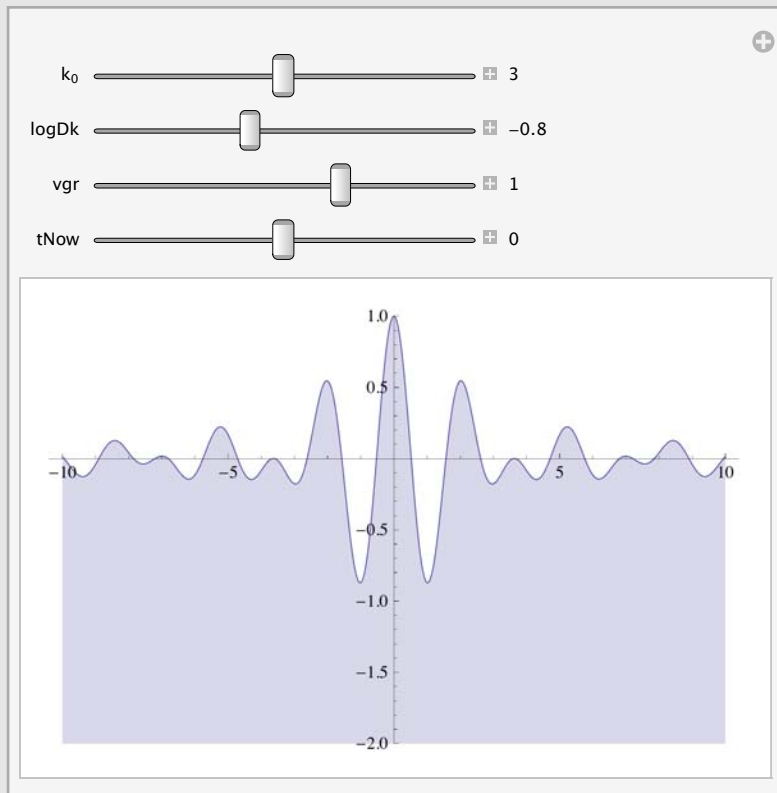
The wave packet as a collection of waves

We start with a wave packet made up of a finite collection of cosine waves of the form $\text{Cos}[k x - \omega t]$, note the time dependence.

In[1]:=

```
PsiWave = Cos[k x - ω t] /. {k → k0 + dk #, ω → ω0 + vgr dk #} &;
SumPsiWave = Sum[PsiWave[n], {n, -#, #}] / (2 # + 1) &;
Manipulate[Plot[SumPsiWave[5] /. {k0 → k0, dk → 10^logDk, ω0 → k0, vgr → vgr, t → tNow},
  {x, -10, 10}, PlotRange → {-2, 1}, PerformanceGoal → Quality, Filling → Bottom],
  {{k0, 3}, 1, 5, 0.5, Appearance → "Labeled"},
  {{logDk, -0.8}, -2, 1, 0.1, Appearance → "Labeled"},
  {{vgr, 1}, -1, 2, 0.1, Appearance → "Labeled"},
  {{tNow, 0}, -10, 10, 0.5, Appearance → "Labeled"}]
```

Out[3]:=



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