

Wave Propagation and Reflection

```
Clear["Global`*"];
Off[General::spell1];
```

- Define a Gaussian wave packet propagating in the +x direction with $v=1$ and which is reflected at $x = 10$

```
val = {v → 1, xref → 10, cref → +1};

coordwav[x_, t_] = {x,  $e^{-(x-vt)^2} + \text{cref } e^{-(x-2\text{xref}+vt)^2}$ } /. val;

coordvel[x_, t_] = {x,  $2v(x-vt) e^{-(x-vt)^2} - 2v(x-2\text{xref}+vt) \text{cref } e^{-(x-2\text{xref}+vt)^2}$ } /. val;
```

- Make a movie by plotting the wave function (red) and the vertical velocity (green) as a function of x for successive values of t

```
wplot[t_] := ParametricPlot[Evaluate[{coordwav[x, t], coordvel[x, t]},
  {x, -2, 10}, GridLines → Automatic, Frame → True, PlotRange → {{-2, 10}, {-2, 2}},
  PlotStyle → {RGBColor[1, 0, 0], RGBColor[0, 1, 0]},
  FrameLabel → {"x", "f"}, RotateLabel → False];

plotarray = Table[wplot[tp], {tp, 0, 20, 1}];
```

