

## Standing Wave from Reflected Travelling Wave

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

- Define two Cos waves with  $k=(n \pi)/L$  and velocity  $cw$ : one traveling in the  $+x$  direction, and a reflected (inverted) one originating at  $x=2L$  and traveling in the  $-x$  direction. Note: the number of anti-nodes in the resulting standing wave is just  $n$ .

```
val = {cw -> 1, L -> 10, n -> 3};
```

```
wave1[x_, t_] = Cos[ $\frac{n \pi}{L} (x - cw t)$ ] /. val;
```

```
wave2[x_, t_] = -Cos[ $\frac{n \pi}{L} (x - 2 L + cw t)$ ] /. val;
```

- Make a movie of the right-going wave (blue), the left-going wave (green), and their sum (red)

```
wplot[t_] := Plot[Evaluate[{wave1[x, t], wave2[x, t], wave1[x, t] + wave2[x, t]}],
  {x, 0, 10}, PlotRange -> {{0, 10}, {-2, 2}},
  PlotStyle -> {RGBColor[0, 0, 1], RGBColor[0, 1, 0], RGBColor[1, 0, 0]},
  GridLines -> Automatic, Frame -> True, FrameLabel -> {"x", "f"}, RotateLabel -> False];
```

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

