
Triangular Targets

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Triangular Wave Functions

Max dims of the parts is 406 mmW x 355mm L x 406mm H

```
close all; clear
```

```
x = 0:.1:310;
```

```
% Triangular wave
```

```
tri = @(x, lambda, A) A*sawtooth(2*pi./lambda * x, 0.5);
```

```
% Chirp
```

```
k = @(lam0, lam1, x) (1/lam1-1/lam0)/(x(end)-x(1)); %freq rate change
```

```
f = @(lam0, lam1, x) (1/lam0) + k(lam0, lam1, x)*x./2;
```

```
fmchirp = @(lam0, lam1, x, A) A * cos(2*pi*f(lam0, lam1, x).*x);
```

Row 1: Period of 150-mm (amplitude 30-mm)

```
figure(1)
```

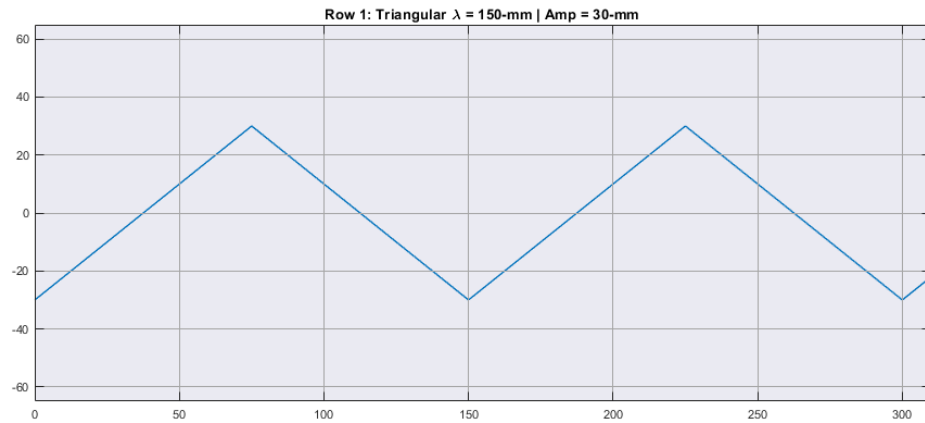
```
lambda = 150;
```

```
A = 30;
```

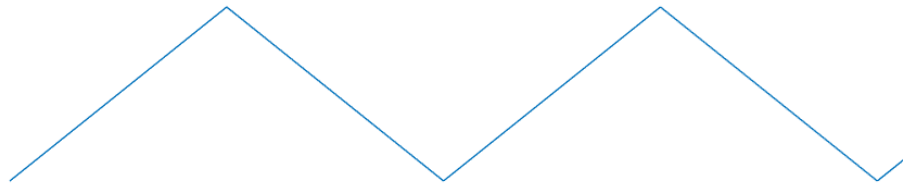
```
plot(x, tri(x, lambda, A), 'LineWidth', 1);
```

```
title(['Row 1: Triangular \lambda = ' num2str(lambda) '-mm | Amp = ' num2str(A) '-mm']);
```

```
axis square equal;
```

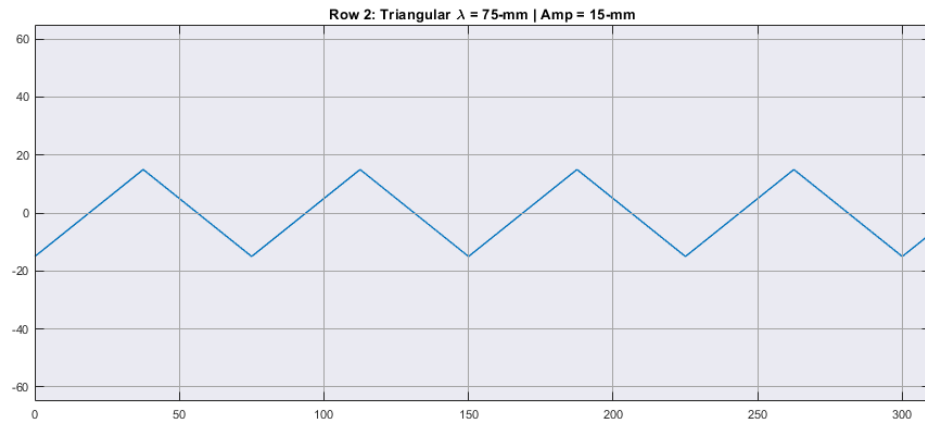


```
axis off;  
title '';  
saveas(gcf, 'triangRow1.svg');
```



Row 2: Period of 75-mm (amplitude 15-mm)

```
figure(2)  
lambda = 75;  
A = 15;  
plot(x, tri(x, lambda, A), 'LineWidth', 1);  
title(['Row 2: Triangular \lambda = ' num2str(lambda) '-mm | Amp = '  
    num2str(A) '-mm']);  
axis square equal;
```

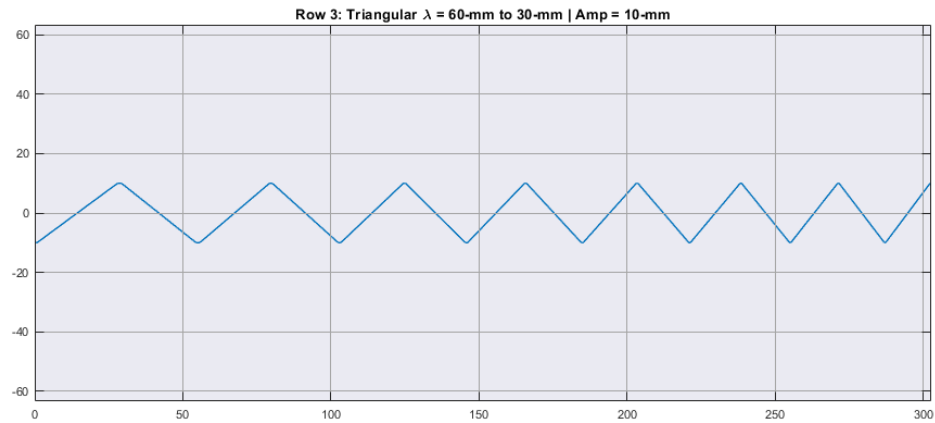


```
axis off;
title '';
saveas(gcf, 'triangRow2.svg');
```



Row 3: Period of 60-mm to 30-mm (amplitude 10-mm)

```
figure(3)
lambda0 = 60;
lambda1 = 30;
A = 10;
y = fmchirp(lambda0, lambda1, x, A);
tol = 0.01;
idx = (abs(diff(y)) <= tol);
plot(x(idx), -y(idx), 'LineWidth', 1);
title(['Row 3: Triangular \lambda = ' num2str(lambda0) '-mm to '
      num2str(lambda1) '-mm | Amp = ' num2str(A) '-mm']);
axis square equal;
```



```
axis off;
title '';
saveas(gcf, 'triangRow3.svg');
```



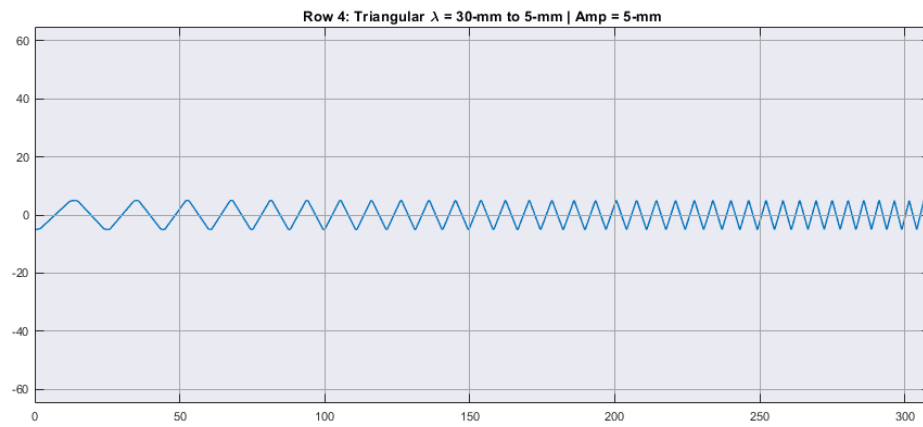
Row 4: Period of 30-mm to 5-mm (amplitude 5-mm)

You'll see here that the tolerance for detecting peaks doesn't have enough range for a perfect transform, but its good enough for the printer tolerances.

```
figure(4)
lambda0 = 30;
lambda1 = 5;
A = 5;

y = fmchirp(lambda0, lambda1, x, A);
tol = 0.05;
idx = (abs(diff(y)) <= tol);
plot(x(idx), -y(idx), 'LineWidth', 1);
title(['Row 4: Triangular \lambda = ' num2str(lambda0) '-mm to '
      num2str(lambda1) '-mm | Amp = ' num2str(A) '-mm']);
```

```
axis square equal;
```



```
axis off;  
title '';  
saveas(gcf, 'triangRow4.svg');
```



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