

Theoretical Power Production

Define latitude of the solar panels and declination of the sun

```
lat = 42 + 17/60;  
dec = 23.50;
```

Conversion from degrees to radians

```
lat = lat * pi/180;  
dec = deg2rad(dec);
```

```
t = 5.5:0.25:20;  
LST = t - 1 + 14.6/60;
```

Determine the amount of solar irradiance on the solar panels

$I_{\text{panel}} = I_{\text{inc}} \sin(\alpha)$,

```
sunangle = sin(dec)*sin(lat) + cos(dec)*cosd(15*(LST-12));  
S_inc = 1.4883*0.7.^(sunangle.^-0.678);
```

Calculate the final theoretical production for entire solar panel array

```
production_theory = min(270 * S_inc .* sunangle, 207);  
%plot(t, production_theory);  
xlabel('Time of Day');  
ylabel('Energy Production (kW)');  
  
%plot(Production.Timestamp, Production.AH3);  
  
June2018 = reshape(Production.AH3, 96, 30);  
dayofInterest = June2018(:, 26);  
tfullday = 0:0.25:23.75;  
plot(tfullday, dayofInterest, t, production_theory)
```

Warning: Imaginary parts of complex X and/or Y arguments ignored.

