

ECE331 HW6 - Question 1

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Variables

Variables used in the equations

```
f = 60;  
I = 10;  
K = 0.06;  
w = 2*pi*f;  
t = 0:0.0001:0.1;
```

Equations

Equations for B-field of each phase and total

```
Ba = K*I*cos(w*t)*exp(1i*0);  
Bb = K*I*cos(w*t-((2*pi)/3))*exp(1i*((2*pi)/3));  
Bc = K*I*cos(w*t+((2*pi)/3))*exp(1i*((-2*pi)/3));  
Bs = Ba+Bb+Bc;
```

Plotting

Initial plot to get axis set and hold the compass plot

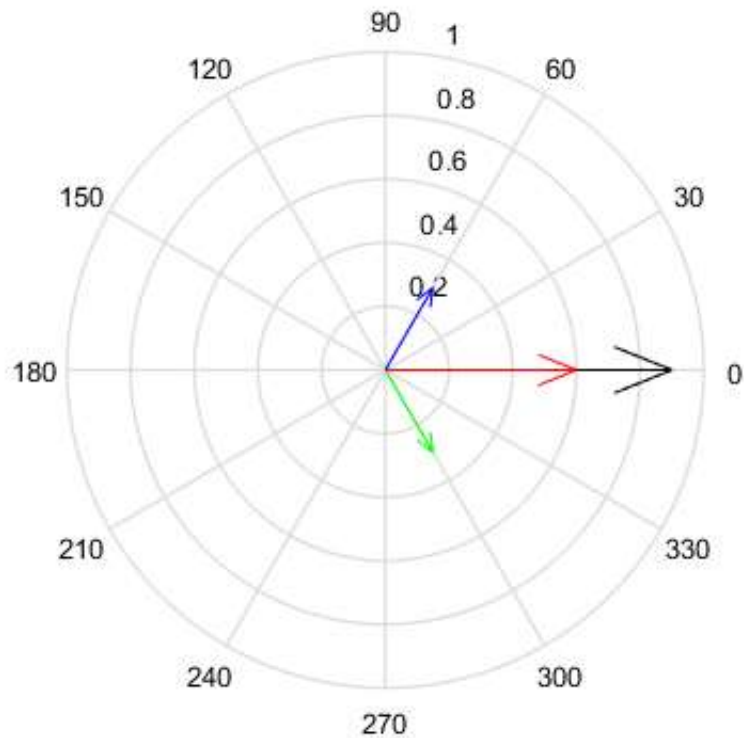
```
yBs = compass(Bs(1),'k'); % Total B-field plotted in black  
hold  
yBa = compass(Ba(1),'r'); % Phase A B-field plotted in red  
yBb = compass(Bb(1),'g'); % Phase B B-field plotted in green  
yBc = compass(Bc(1),'b'); % Phase C B-field plotted in blue  
  
% Loop to delete previous B-field plots and plot new values based off time  
% This will loop through the matrix for 6 cycles  
for x = 1:1001  
    delete(yBs); % Delete previous graphed value  
    delete(yBa);  
    delete(yBb);  
    delete(yBc);  
  
    yBs = compass(Bs(x),'k');  
    yBa = compass(Ba(x),'r');
```

```

yBb = compass(Bb(x),'g');
yBc = compass(Bc(x),'b');
drawnow % Plots new values on compass
end

```

Current plot held



Results

```

% The animated compass graph shows Phases A, B, C as vectors increasing and
% decreasing as current-field changes. These vectors are added together to
% create the total B-field which rotates counter-clockwise around the axis.

% The graph shown above is the initial system, but if the code is run a live
% plot will shown the rotating magnetic field.

```

Discussion

```

% Changing the magnetizing current affects the magnitude of the B-fields in
% the system. However, changing the frequency will change the rate at which
% the rotating magnetic field of Bs rotates.

```

