

## Assignment 4

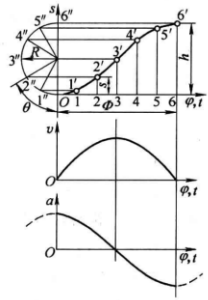
### Write the code for graphical synthesis of a cam profile.

Note:

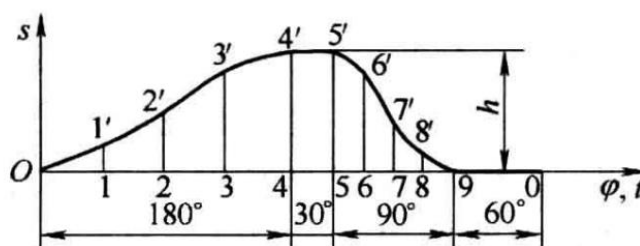
1. You can select any of the follower motion curves;
2. The complete cam profile must be plotted;
3. Coding with Matlab is suggested.

偏置尖顶直动从动件盘形凸轮

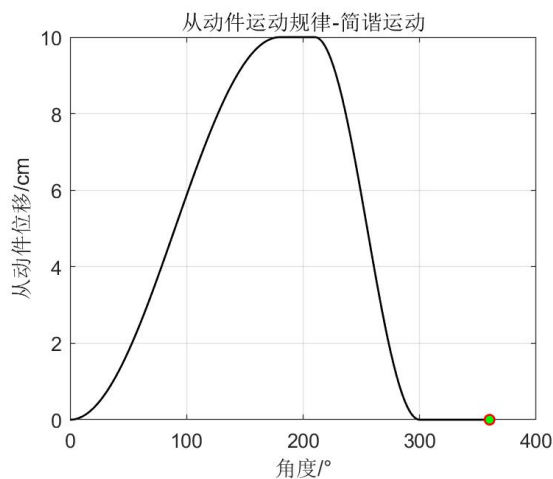
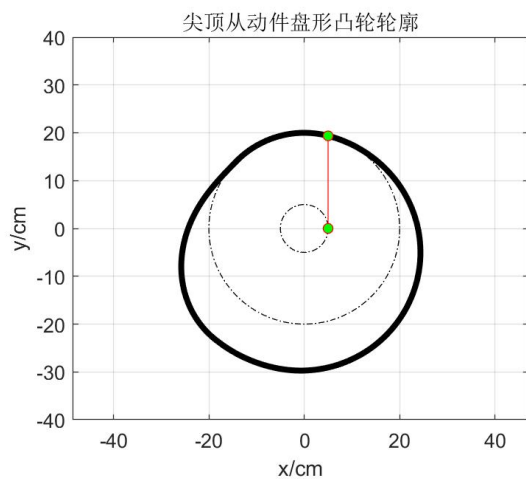
- 1) 设定基圆半径  $r=20\text{cm}$ , 偏置  $e=5\text{cm}$ , 从动件行程  $h=10\text{cm}$
- 2) 设定从动件位移曲线为简谐运动(如下图)

运动规律	运动方程	推程运动线图	冲击
简谐运动	推程 $s = \frac{h}{2} \left( 1 - \cos \frac{\pi}{\Phi} \varphi \right)$ $v = \frac{h\pi\omega}{2\Phi} \sin \frac{\pi}{\Phi} \varphi$ $a = \frac{h\pi^2\omega^2}{2\Phi^2} \cos \frac{\pi}{\Phi} \varphi$		柔性
	回程 $s = \frac{h}{2} \left[ 1 + \cos \frac{\pi}{\Phi'} (\varphi - \Phi - \Phi_s) \right]$ $v = -\frac{h\pi\omega}{2\Phi'} \sin \frac{\pi}{\Phi'} (\varphi - \Phi - \Phi_s)$ $a = -\frac{h\pi^2\omega^2}{2\Phi'^2} \cos \frac{\pi}{\Phi'} (\varphi - \Phi - \Phi_s)$		

- 3) 推程运动角、远休止角、回程运动角和近休止分别为:  $180^\circ$ ,  $30^\circ$ ,  $90^\circ$  和  $60^\circ$  (如下图)



- 4) 由 matlab 所得凸轮轮廓与从动件位移如下



5) Matlab 从动件位移曲线

```
theta_push = 180; % 推程角度
theta_FarRest = 30;% 远休止角度
theta_return = 90;% 回程角度
theta_nearRest = 60;% 近休止角度 位移为0
if theta < theta_push
    % 推程 教材中简谐运动推程方程
    Displacement = h/2-(h/2)*cos(pi*theta/theta_push);
elseif theta < theta_push+theta_FarRest
    % 远休止 处于行程位置
    Displacement = h;
elseif theta < theta_push+theta_FarRest+theta_return
    % 回程 教材中简谐运动回程方程
    Displacement = h/2+(h/2)*cos(pi*(theta-theta_push-theta_FarRest)/theta_return);
else
    %近休止 无位移
    Displacement = 0;
end
```

6) Matlab 代码与运行视频见附件