AE 504

Homework 2

```
clear all
close all
clc
```

Ex. 1

Part b)

```
M1=4;
R=287;
g=1.4;

syms msol betasol thetasol

theta=25.2;
dtheta=0.1;

for i=1:500
    %wedge angle in radians
    thetarad=theta*pi/180;
    %wave angle from the theta-beta-m eqn
    beta1=abs(double(vpasolve(tan(thetarad)/(2*cot(betasol)) == ...
                ((M1^2*sin(betasol)^2)-1)/(M1^2*(g+cos(2*betasol))+...
                2),betasol,0.6071)));
              %normal mach number before shock
    M1n=M1*sin(beta1);
    %normal mach number after shock
    M2n=sqrt((M1n^2+(2/(g-1)))/(((2*g)/(g-1))*M1n^2-1));
    %mach number after shock
    M2=M2n/sin(beta1-thetarad);
    mu=asin(1/M2)*180/pi;
    betaarray=[mu:0.5:90]*pi/180;
    for j=1:length(betaarray)
    theta2(j)=abs(double(vpasolve(tan(thetasol)/(2*cot(betaarray(j)))
 == ...
                ((M2^2*sin(betaarray(j))^2)-1)/(M2^2*(g
+cos(2*betaarray(j)))+...
                2),thetasol,0.6071)));
    end
    thetamax=max(theta2);
    diff=thetamax-thetarad;
    %condition for oblique shock
    %beta needs to be in a range of values between 90° and the mach
 angle
    if diff<1e-3
        sol=thetarad;
        break
    else
```

```
        theta=theta+dtheta;

    end
end
fprintf("The Mach reflection occurs at theta = %1.2f°",sol*180/pi)
```

```
The Mach reflection occurs at theta = 25.60°
```

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