Høgskulen på Vestlandet — Avdeling for Ingeniørutdanning Institutt for Maskin- og Marinfag	Løsning Øv 10

MATLAB løsning:

```
% Øving 10
% Dynamical stability, work performed to slowly incline a ship
% to a certain angle, neglecting water and air resistance
% Do not confuse with dynamic stability with respect to time.
clear all
% Eks 4.3-4.4 Intro to naval architecture Tupper p65-p.69
% Calculate the dynamical stability
%% Task a)
mi=[4200 9100 1500 200]*1000;
zi=[6 7 1.1 7.5];
delta=sum(mi)
KG=(mi*zi')/delta; % Tyngdepunktsatsen, vektormultiplikasjon brukt

phi=[0:15:90];
SY=[0 0.11 0.36 0.58 0.38 -0.05 -0.6]; % Arbitrary point S not = K and is
above G
KS=6.5; % Given in task
GS=KS-KG;
GZ=SY + GS.*sind(phi)

phi_ref=0:1:90; % refine x axis for y-value spline fit
GZref=spline(phi,GZ,phi_ref);

figure(1)
plot(phi, GZ,'x',phi_ref,GZref,'-r')
xlabel('\phi [deg]'); ylabel('GZ [m]');
legend('Data points given','Non-linear interpolation','location','sw')

%% Task b)
ind=find(GZref>0);
ROS=phi_ref(ind(end))-phi_ref(ind(1)) % Range of stability

%% Task c)
% Dynamical stability at 60 deg inclination
ind60=find(phi_ref==60)
At=trapz(phi_ref(1:ind60),GZref(1:ind60))*pi/180 % [mrad] area under
curve
As=simps(phi(1:5),GZ(1:5))*pi/180 % [mrad] Simpson metoden gitte punkter
At2=trapz(phi(1:5),GZ(1:5))*pi/180 % m[rad] Trapz på gitte punkter
% plot tabell for å jamføre med håndberegninger:
sf=[1 4 2 4 1];
Tabell=[phi(1:5)' GZ(1:5)' sf' (sf.*GZ(1:5))']
summe=sum(sf.*GZ(1:5))

Wt=delta*9.81*At % Work (potential energy) in [Nm]
Ws=delta*9.81*As % Work (potential energy) in [Nm]
Wt2=delta*9.81*At2
```