**Testing friction factor in OsCaR**

Fist we plot the results of a test conducted on coarse sand over a range of wave periods which are typically found in coastal ecosystems, and which represent the limits of what is possible in OsCaR.

close all

clear variables

cd('Waveperiod')

load('umax.txt'); umax = umax./100;

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load('waveperiod.txt');

figure;

hold on

plot(amax,umax(:,1),'.k','markersize',10)

xlabel('T (s)')

ylabel('u\_{cr} (m s^{-1})')

axis([0.25 0.6 0.25 0.40])

Clearly, there is a positive relation between wave period and the peak orbital velocity needed for sediment erosion, which can be related to the reduction in flow acceleration.

Given that tau\_cr is equal across the measurements, as sediment remained identical, this change may only be attributed to a change in the friction factor. Here we assess whether the friction factor in OsCaR is realistic in terms of its relation with wave period.

taucrit = 0.65; % crit bed shear stress of sand

rho = 1025; % density of salt water

ks = 0.00135;

fw\_fit = 0.0076.\*amax.^-0.52;

fw\_soulsby = 1.39.\*(amax./((1/30)\*ks)).^-0.52;

umax\_calc = sqrt(taucrit./(0.5.\*rho.\*fw\_fit));

umax\_soulsby = sqrt(taucrit./(0.5.\*rho.\*fw\_soulsby));

plot(sort(amax,1),sort(umax\_calc,1),'--k')

%plot(sort(amax,1),sort(umax\_soulsby,1),'--k');

legend('measured','eq. 4'); legend BOXOFF

rsq = corrcoef(umax(:,1),umax\_calc);

text(0.51,0.37,['R^2 = ',num2str(rsq(1,2).^2,2)]);

model = fitlm(umax(:,1),umax\_calc);

model