Michael Bocamazo

# Precis on previous simulator code

# World Model:

velocity not a state variable in determining velocity, that is, velocity is determined solely by wind speed and relative angle

Eric: centripetal acceleration VI means angular acceleration

Angular Acceleration:

Returns heading changed and rate of turn given robot velocity, previous rate of turn, rudder angle, robot heading, and time since last calculation.

or:f

This vi follows the formula A=([V\_old,0]x[0,0,tan(Ra)/.3\*norm(V\_old)]);

Vnew=norm(V\_old)/norm(V\_old+A)\*(V\_old+A)

The magic number .3 indicated .3 meters between the rudder and the center of rotation

Need to understand the angular acceleration formula

Assumes rate of change is directly proportional to both rudder angle and velocity, and then adds 10% of the previous rate of turn to account for momentum.

Drag force:

Calculates the hydrodynamic drag force on the boat. Drag force has two components:

1. hull drag, which is proportional to a fixed hull drag coefficient and the square of the boat speed, and

2. rudder drag, which is proportional to a rudder drag coefficient, the amount of rudder surface as viewed from the front of the boat (sine of rudder angle), and the square of the boat speed.

by Jason

Velocity:

if (wind > 90) //between beam reach and a run

speed = z\*(wind - 90)/90 + y\*(180 - wind)/90;

else //between close hauled and beam reach

//need to account for irons range

speed = y\*((wind-irons)/(90-irons)) + x\*((wind - 90)/(irons - 90));

xinput = sailposition

closehauled:

x=exp(-(x - .4)\*\*2/.05)

beam:

y=exp(-(x-.6)\*\*2/.075)

run:

z=exp(-(x-1)\*\*2/.25)

meant to be normal distributions on expected speed for certain regimes

Wind is modeled as constant with a flat distribution of a certain amplitude

# What ought to be changed?

Should add some elements of realism to the drag forces

Want to add realism to sensitive calculations such as the tacking/turning simulation

Should be a second order system