

Ship physics simulation beta

This pack help simulating water vehicles by providing rigidbodies buoyancy propeties. Includes ship floodable compartments. Ships can be build with just a hull buoyancy object or by attaching multiple compartments together.

With this package is included a physics based engine simulation wich outputs a force that can be used to move objects. In this case it is included a basic shop prop simulation.

Using this package along with flight physics. It is posible to model hidroplanes. An example is included in the pack.

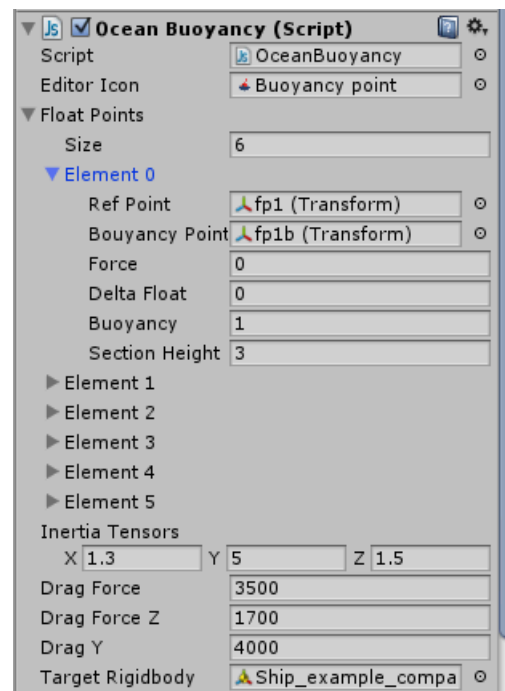
The only requisit for using this ship simulation in any ocean is that the ocean has the capability to sample the ocean height at an specified location. Each float point used to compute buoyancy uses a buoyancy point reference wich has to be moved vertically based in the ocean height.

For further implementation questions please mail to gabriel.campitelli@gmail.com
Remember that this is a beta stage.

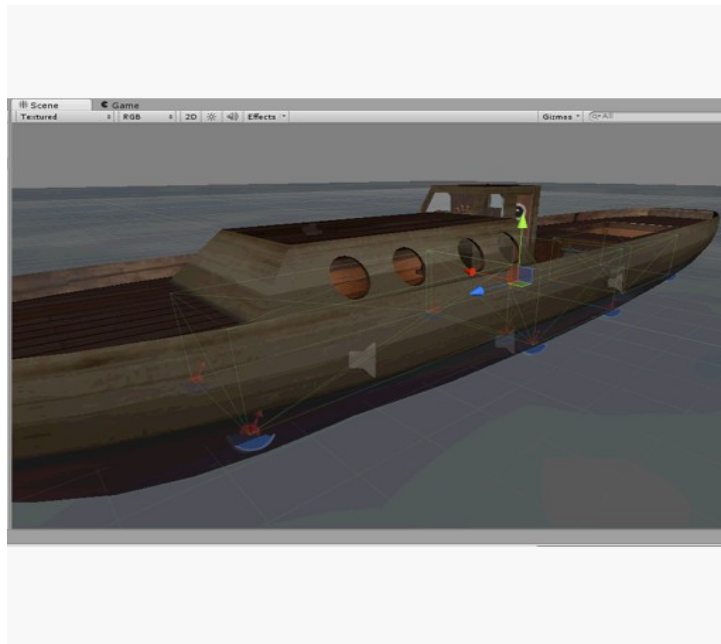
Setting up buoyancy script

Add the script to a rigidbody and assign the buoyancy points.

- Ref point: the float point reference attached to the ship. (see example ship)
- Buoyancy point: The point that is affected by ocean height. Add a “fixedOceanHeight” component or you custom ocean height sampler.
- Buoyancy value (area represented by point)
- Section height. The height in meters for that point.
- Drag force: lateral drag.
- Drag force Z: forward drag
- Drag Y : vertical drag.
- Target rigidbody. Wich rigidbody is affected by this buoyancy script.



Compartments

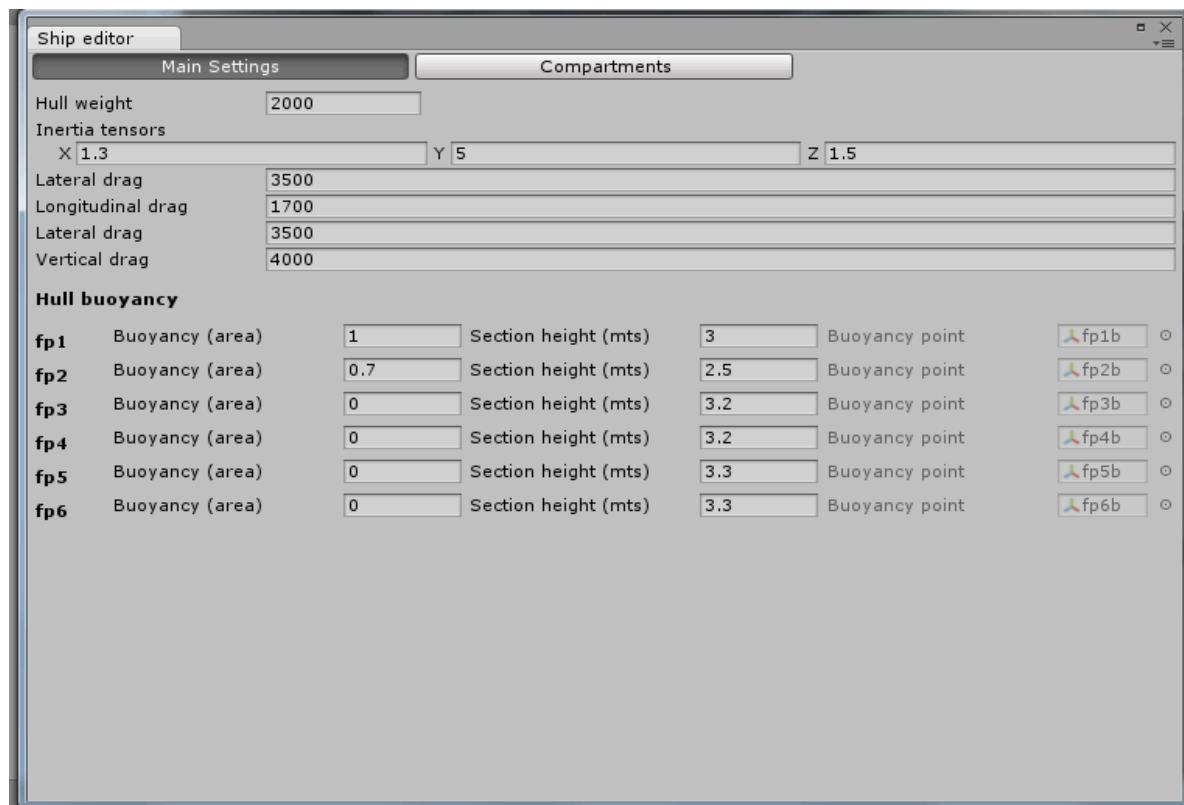


Compartments are buoyancy rigidbodies attached together physically. Also has the compartment script attached. See the example ship included in the vehicle library folder.

All components of the ship can be edited through the vehicle editor window.

Editing the ship

To edit a ship select a valid object and go to Windows/Usim/edit selected vehicle.



Main Settings:

- Hull weight: The mass of the root object rigidbody.
- Inertia tensor factors.
- Lateral drag: Sideways drag force.
- Longitudinal drag: forward drag force.
- Vertical drag: up drag force.

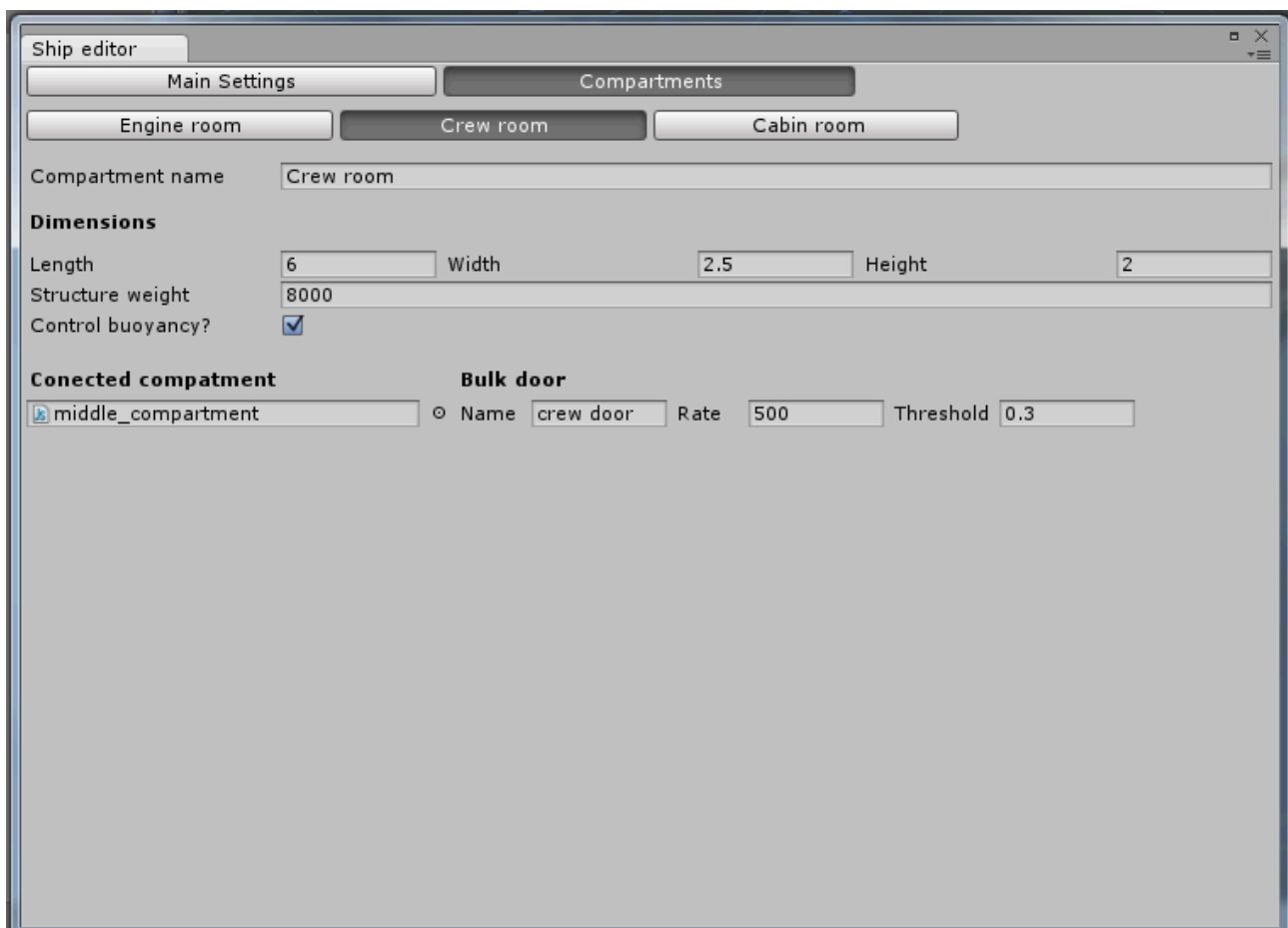
Hull buoyancy

Each buoyancy point is shown. This points are used for calculations at location.

- Buoyancy: buoyancy value. It should be the area represented by the point.
- Section height in mts.

Compartments window

Each found compartment is shown. Click on a compartment to edit.



The screenshot shows a software window titled "Ship editor" with a tabbed interface. The "Compartments" tab is active, showing three sub-tabs: "Engine room", "Crew room" (selected), and "Cabin room". Below the sub-tabs, the "Compartment name" is "Crew room". Under the "Dimensions" section, there are input fields for "Length" (6), "Width" (2.5), and "Height" (2). The "Structure weight" is 8000, and "Control buoyancy?" is checked. The "Connected compartment" is "middle_compartment". The "Bulk door" section shows a radio button selected, with "Name" set to "crew door", "Rate" set to 500, and "Threshold" set to 0.3.

Ship editor			
Main Settings		Compartments	
Engine room		Crew room	
Cabin room			
Compartment name	Crew room		
Dimensions			
Length	6	Width	2.5
		Height	2
Structure weight	8000		
Control buoyancy?	<input checked="" type="checkbox"/>		
Connected compartment		Bulk door	
middle_compartment		<input type="radio"/> Name	crew door
		Rate	500
		Threshold	0.3

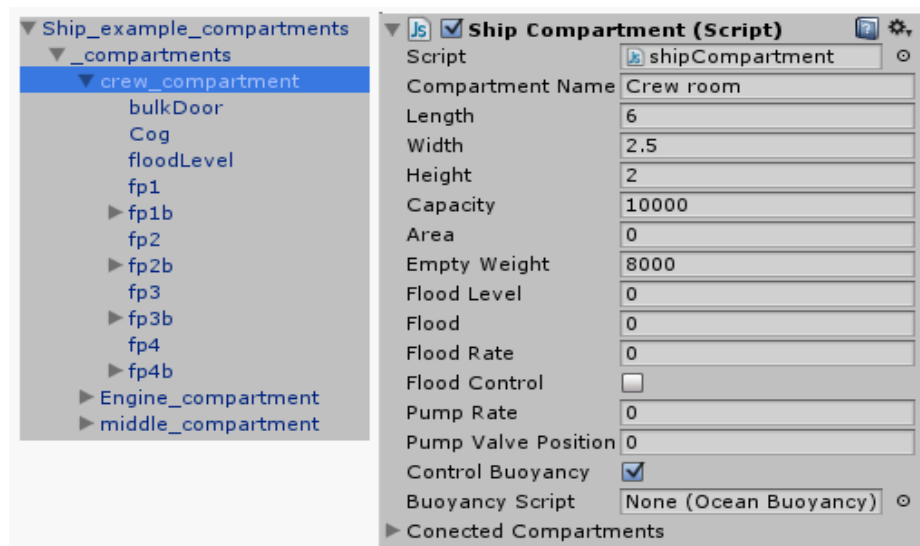
- Dimensions expressed in meters. Length, width, height.
- Attached rigidbody mass.
- Control buoyancy should be on unless you need to have an specific buoyancy behaviour.

Bulk doors

Bulk doors connects two compartments. This allow the flooding to go over the compartment when the flooding threshold is reached.

- Connected compartment : drag a valid compartment object in here.
- Rate: flooding rate. This controls how much water goes trough the bulk door.
- Threshold: a value from 0 to 1 based in flood level/ max flood level.

Compartment script overview.



This is in beta state and most functions that are included are not fully supported.

Variables of interest

- Flood rate. Adjust this to pour water in the compartment.
- Flood control: allows flood control through pumps.
- Pump rate. Same as flood rate but in the opposite direction.
- Pump value position: from 0 to 1. 0 closed, 1 open.