

RESEARCH INTO THE SIMULATION OF SHOCK WAVES

Unity Shock Waves Testing

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API Parameters

The Unity Shock Waves system hides internal particles system parameters and methods with a generic Shockwave API. The Shockwave class has the following as fields and methods:

Shockwave fields and method names	Type	Default	Short Description
<code>initialSpeed</code>	<code>float</code>	500	Initial wave speed
<code>waveMedium</code>	<code>ShockwaveMedium</code>	NULL	Properties of wave medium
<code>color1</code>	<code>UnityEngine.Color</code>	<code>Color.green</code>	Colour for visualised high pressure
<code>color2</code>	<code>UnityEngine.Color</code>	<code>Color.red</code>	Colour for visualised low pressure
<code>visualisation</code>	<code>bool</code>	<code>false</code>	Whether or not to visualise the wave
<code>accuracy</code>	<code>float</code>	1F	The accuracy of the simulation
<code>Setup</code>	Method		
<code>Reset</code>	Method		
<code>Spawn</code>	Method		
<code>FixedUpdate</code>	Method		
<code>OnRenderObject</code>	Method		

The ShockwaveMedium class takes the following input fields:

Shockwave fields	Type
<code>atmosphericPressure</code>	<code>float</code>
<code>heatCapacity</code>	<code>float</code>
<code>speedOfSound</code>	<code>float</code>

Testing Results

Testing was done for the Particle Shock Wave V3 system which implements the generic Shockwave API class.

For a given wave medium with the properties of air at sea level:

(atmospheric pressure = 100000, heat capacity = 1.4, speed of sound = 343)

Input field or method call(s)	Value	Expected Behaviour	Results	Behaviour upon failure
<code>initialSpeed</code>	500	Wave spawns at high speed.	Passed	N/A
<code>initialSpeed</code>	200	Wave does not spawn. Warning outputted to dev console because given speed is slower than speed of sound in the medium.	Passed	N/A
<code>accuracy</code>	1	Wave spawns with the default/optimum number of particles.	Passed	N/A
<code>accuracy</code>	2	Wave spawns with double the default number of particles.	Passed	N/A
<code>accuracy</code>	-1	System outputs error message due to negative input value.	Passed	N/A
<code>Setup</code>		None.	Passed	N/A
<code>Setup, Spawn</code>		Wave spawns.	Passed	N/A
<code>Spawn</code>		System outputs error message because Setup method was not called.	Passed	N/A
<code>Setup, FixedUpdate</code>		Wave spawns.	Passed	N/A
<code>FixedUpdate</code>		System outputs error message because Setup method was not called.	Passed	N/A

Setup, OnRenderObject		Wave spawns and is rendered for the current frame.	Passed	N/A
OnRenderObject		System outputs error message because Setup method was not called.	Passed	N/A
Setup, Spawn, Reset		Wave spawns and then despawns.	Passed	N/A
Setup, Spawn, Reset, Spawn		Wave spawns and then despawns, and then respawns.	Passed	N/A