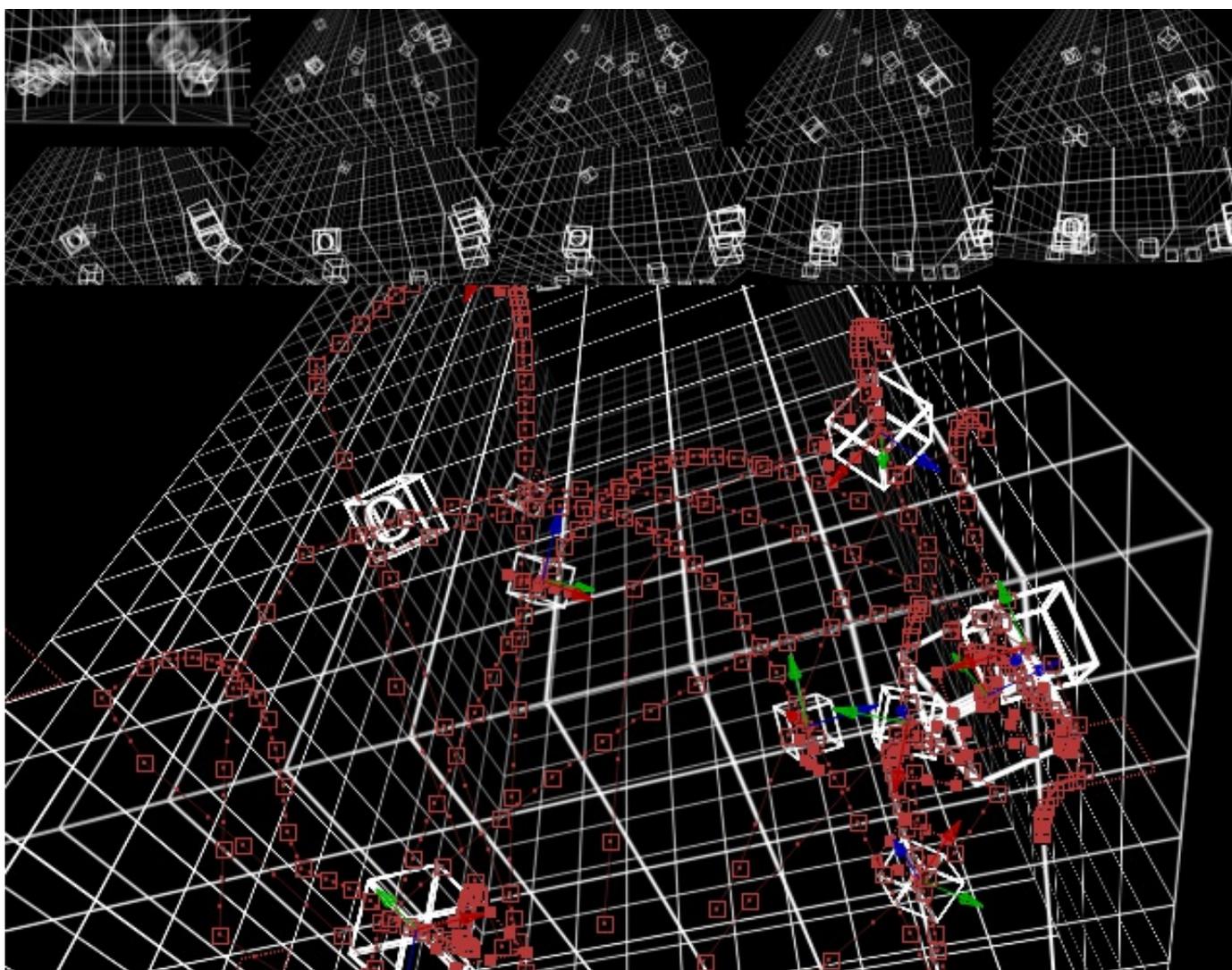


Toy Bricks

A 3D physics simulation plugin
for Adobe After Effects®



User Manual

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Over View

Toy Bricks is a plugin for Adobe After Effects®.

This plugin simulates **physical motion** and **collision** of **rigid bodies** and **constraints** in **3D space**.

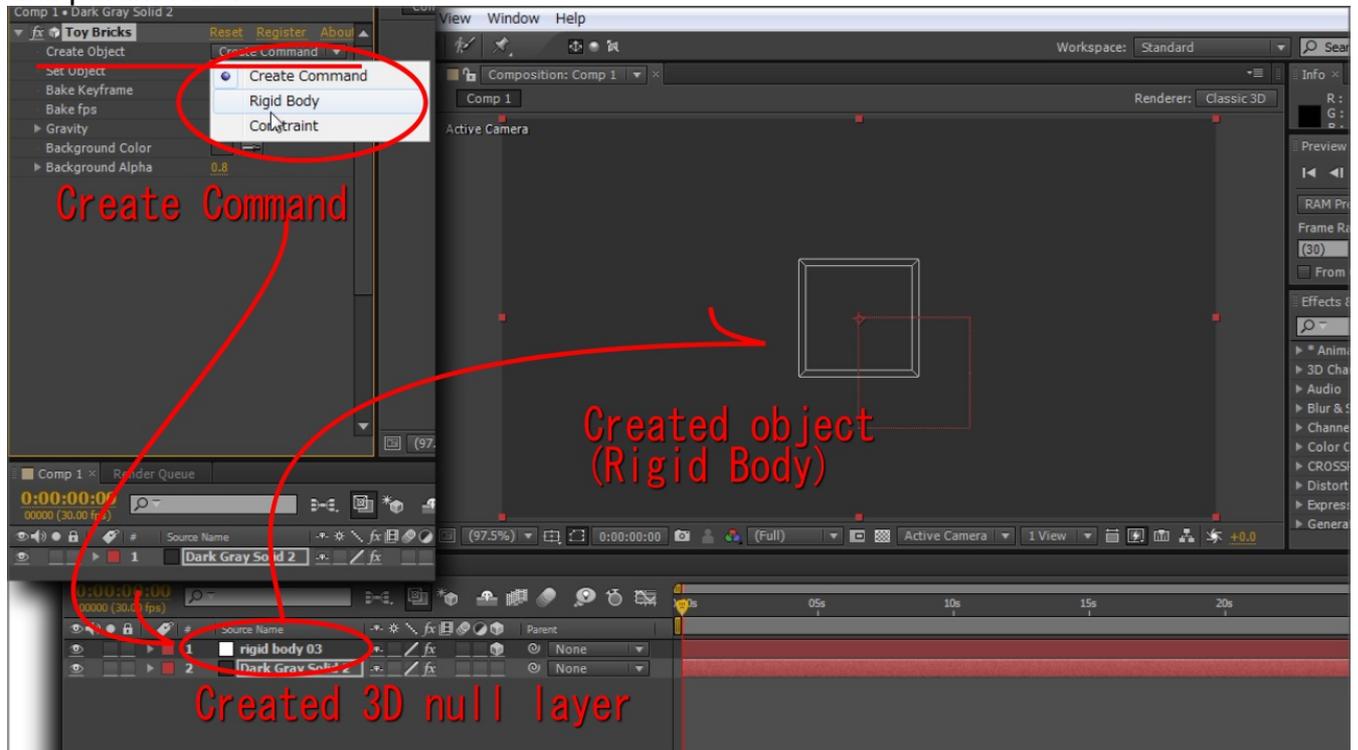
It can export the physical simulation as After Effects keyframes (**bake**).

Working process

Toy Bricks has three modes: Create, Set, Bake.

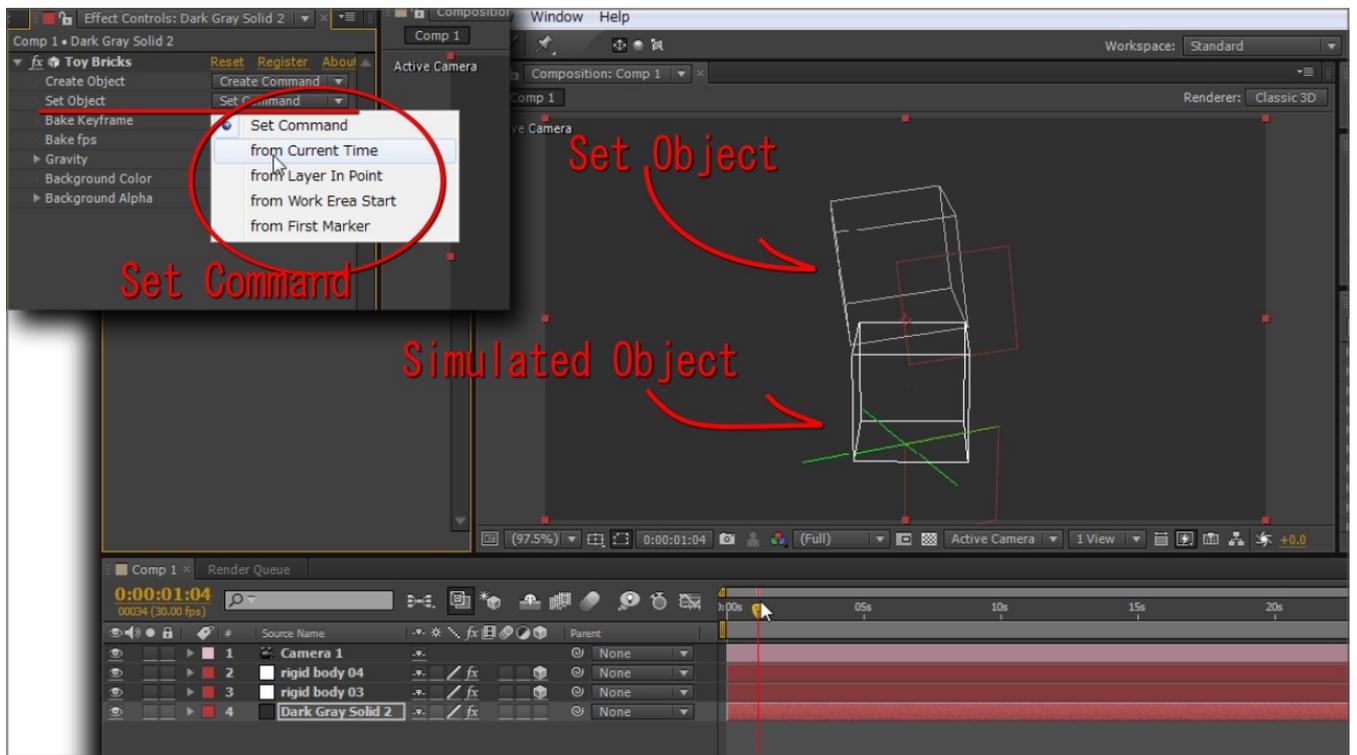
Create

Creates rigid bodies or constraints as 3D null layers. You set their initial position, rotation, and parameters.



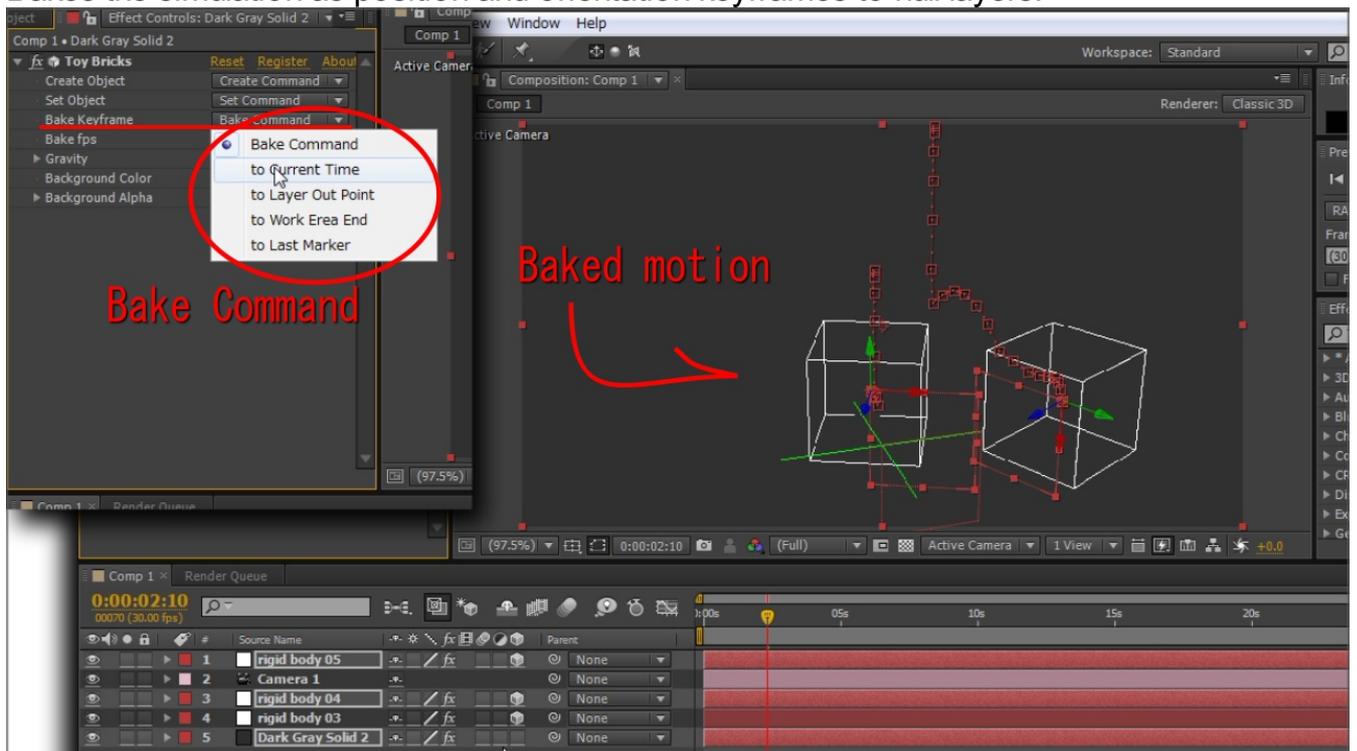
Set

Sets the situation as physical situation and setup simulation world. User can check the simulated motion by scrubbing timeline.



Bake

Bakes the simulation as position and orientation keyframes to null layers.



Reference

Demo movie

Quick start demo movie can be referred:

<http://www.youtube.com/watch?v=VJOoziBmgsw>

Bullet Physics

This plugin uses the [Bullet Physics](#) library. [The user manual](#) helps to explain and learn how the plugin and physical simulation work.

Setup

Platform

- Adobe After Effects (Windows, Mac OS X) CS4 or later.
 - OpenGL version 2.0 or later
(see Edit(Windows)/After Effects(Mac OS) > Preferences > Previews, click "GPU Information..." button).
-

Install

Place the plugin in the 'Plugins' folder inside the After Effects folder. Default directory is:

(win CS6)

C:\Program Files\Adobe\Adobe After Effects CS6\Support Files\Plugin-ins

(mac CS6)

/Applications/Adobe After Effects CS6/Plug-ins

Uninstall

Remove the plugin from the 'Plug-ins' folder.

Setup

Create a layer that is the *same size* and *pixel aspect ratio* as the Composition.
Apply the effect (Effect > CROSSPHERE > Toy Bricks) to the layer.

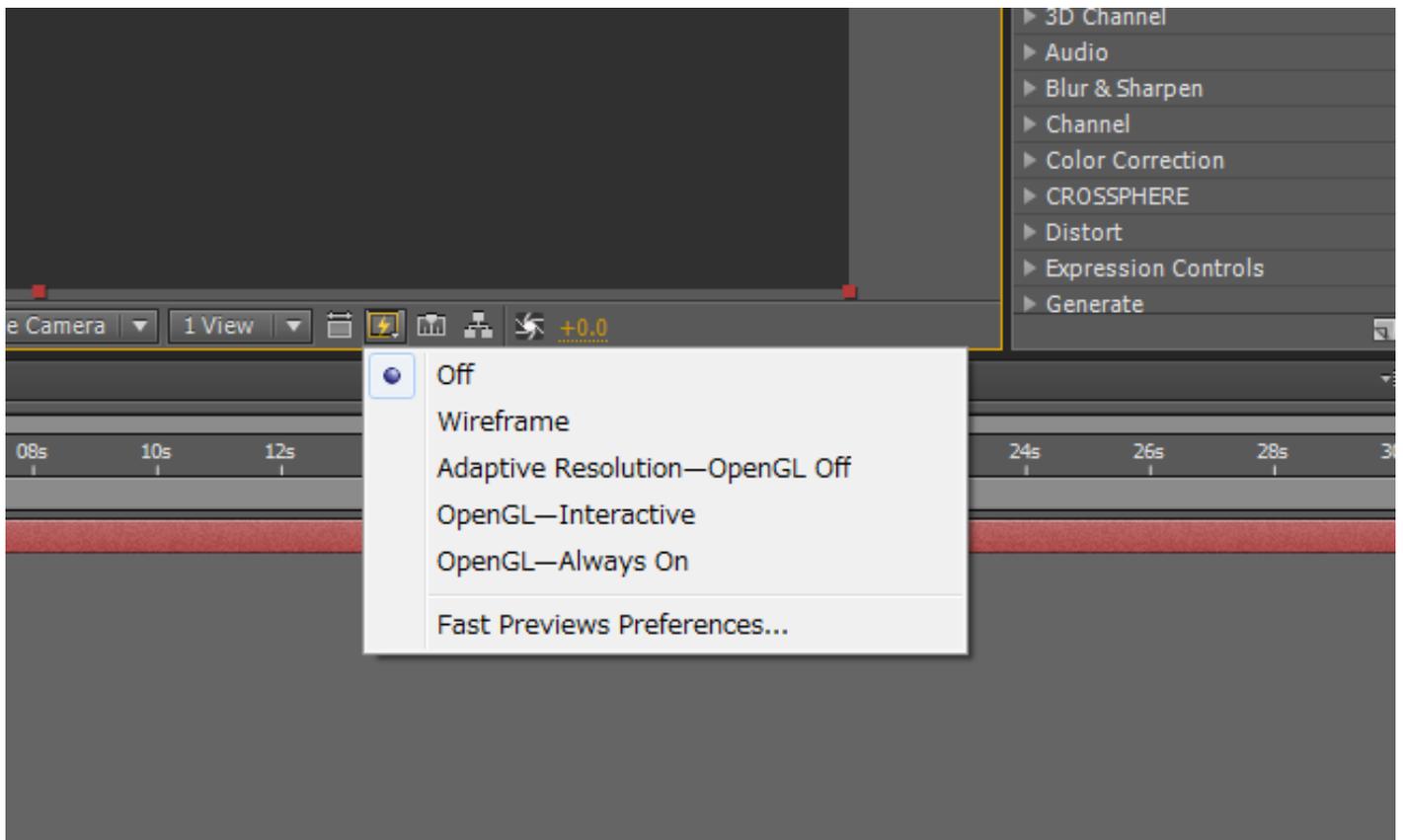
Settings

Turn off Disk Cache

The disk cache in AE CS6 replays old simulation data. To prevent this, turn off disk cache (in Edit(win)/After Effects(mac) > Preferences > General > Media & Disk Cache, switch off "Enable Disk Cache").

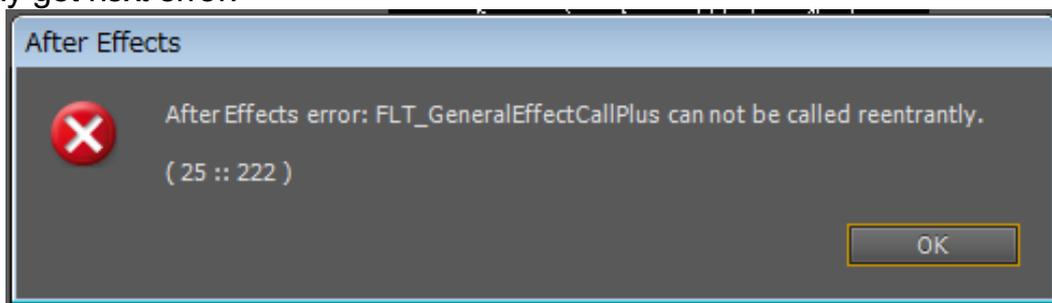
Don't use OpenGL Preview

This plugin does not respond to OpenGL Preview. If the platform is CS5.5 or older, turn off OpenGL preview.



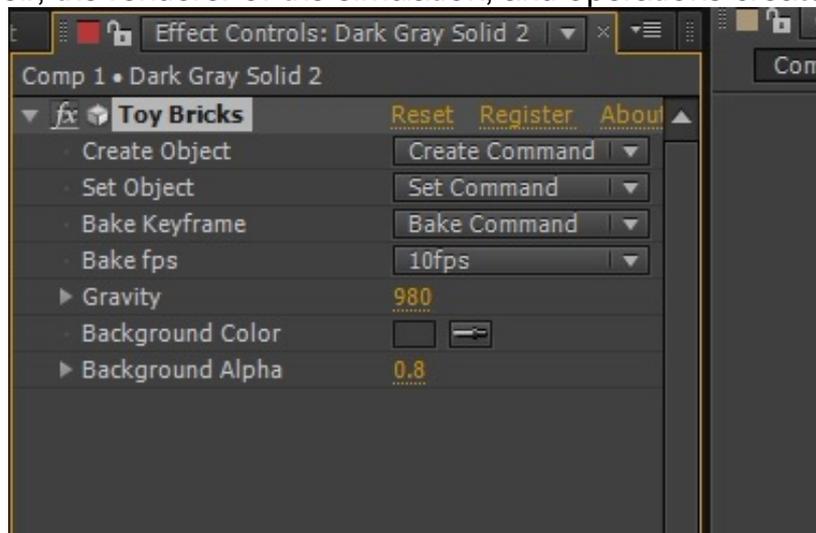
Don't use OpenGL-Interactive or OpenGL-Always On.

Or, user may get next error.



World

The layer first Toy Brick effect applied is Simulation World (just "World" below). World is the simulation scene itself, the renderer of the simulation, and operations create, set and bake.



Parameter UI of World

World layer as renderer

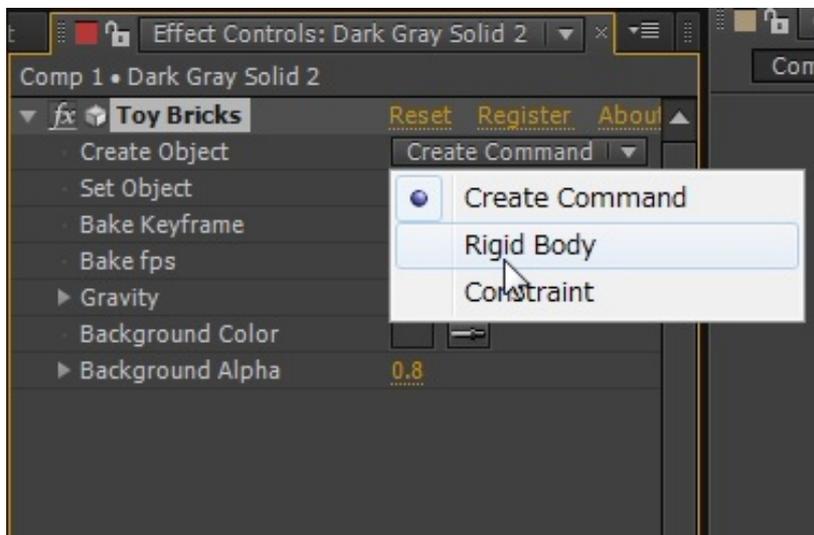
The world layer draws the simulation objects: rigid bodies and constraints in the composition. For the object to draw correctly, this layer needs to be the same size and pixel aspect ratio as the composition. The objects that this layer draws are 1. set objects (not simulated objects) with the layer's video switch on and 2, simulated objects with the layer's effect switch on.

World layer as operator

World has 3 operation commands: create, set, bake.

Create

This operation creates the simulation objects: rigid body or constraint. Running the create command, a new layer is created in the same composition. The new layer is a 3D null layer with the Toy Bricks rigid body/constraint. See also the section [rigid body](#) or [constraint](#).

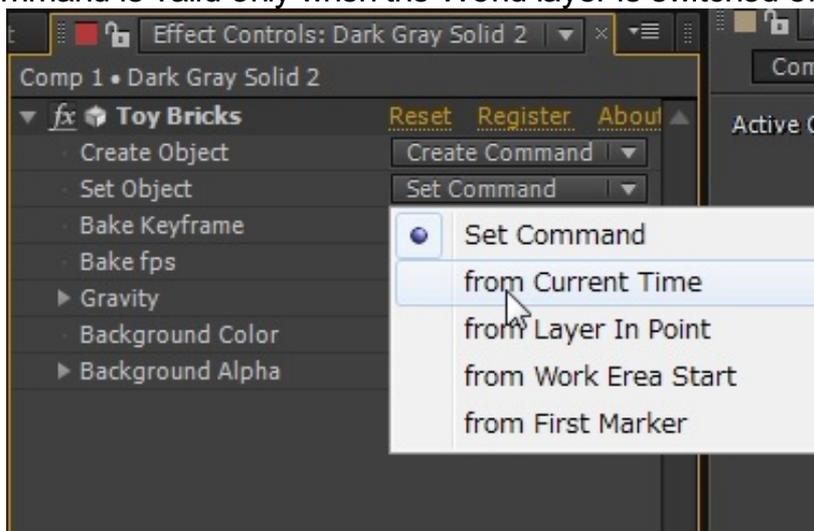


Create command

Set

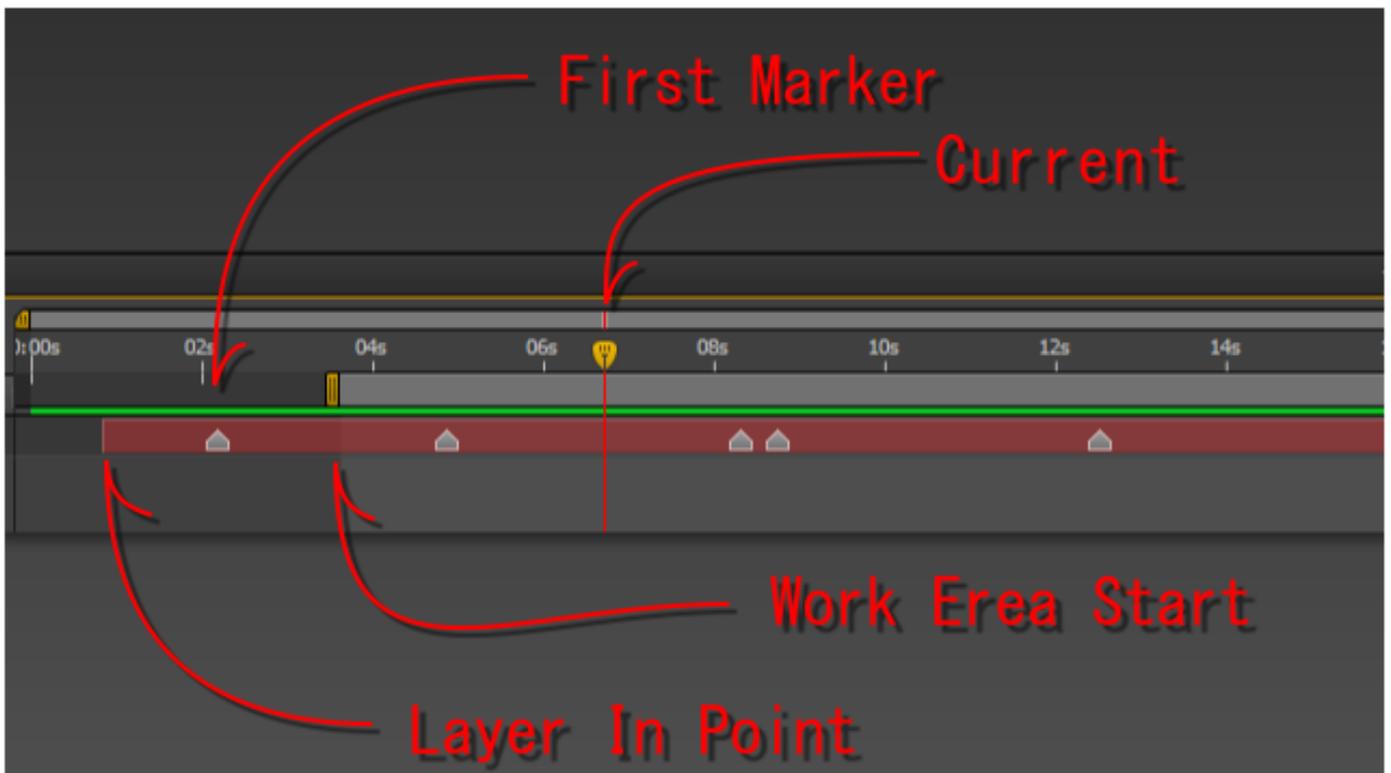
This operation sets objects as physical objects and the simulation is initialized. The simulation starts at the time chosen by the set option: Current Time, Layer In Point, Work Area Start, First Marker.

Note that the set command is valid only when the World layer is switched on.



Set command

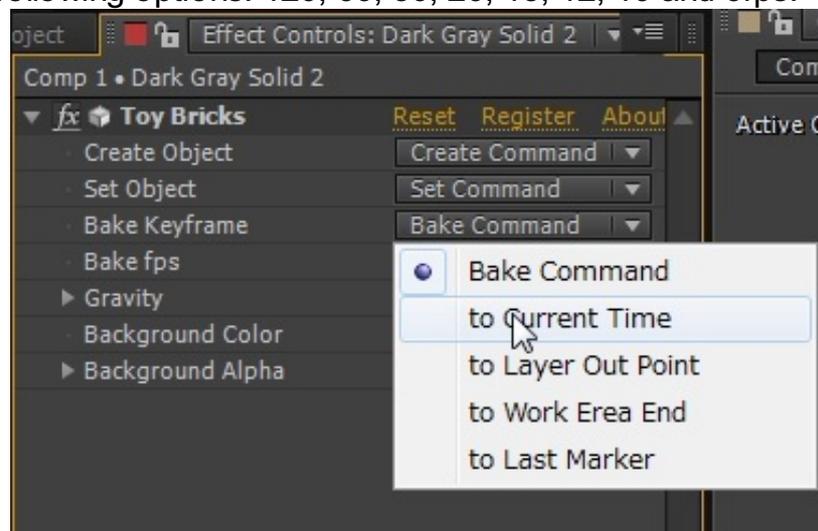
Set from option	
Current Time	Current time in timeline
Layer In Point	In Point of the World layer
Work Area Start	The start time of the work area of the composition
First Marker	The first marker of the World layer (not composition) If there are no markers, then the simulation is set from the layer in point.



Simulation starts

Bake

This operation bakes the simulation position and orientation as keyframes. Baked objects are Dynamic Rigid Body null layers only. Keyframes are baked from the time simulation starts, to the time the bake option is chosen. Fps of the baked keyframes are chosen from Bake fps parameter with the following options: 120, 60, 30, 20, 15, 12, 10 and 6fps.



Bake command

Bake to option	
Current Time	Current time in timeline
Layer Out Point	Out Point of the World layer
Work Area End	The end time of the work area of the composition
Last Marker	The last marker of the World layer (not composition) If there are no markers, the bake command is canceled.

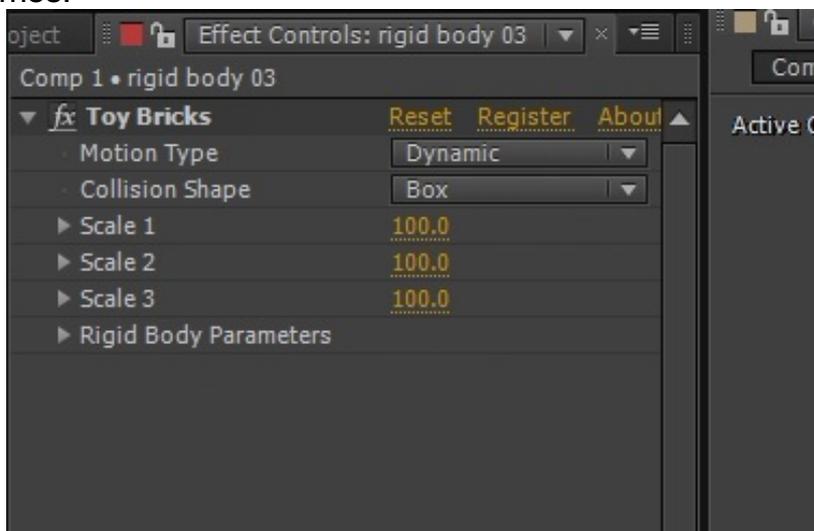
Simulation parameter

Gravity

Gravity of the simulation.

Rigid Body

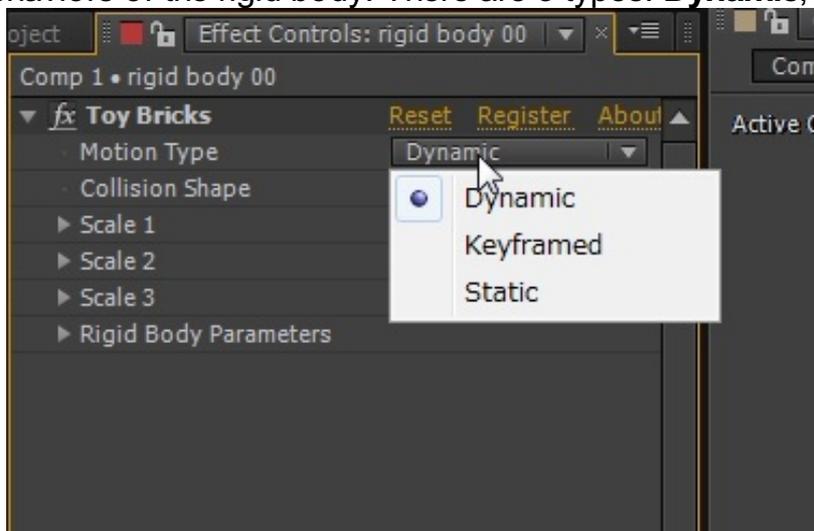
Rigid Body is a 3D null layer generated by the [World](#) create command. You set their shapes, initial states and physical parameters. After the simulation, you can export their motion as baked After Effects keyframes.



Rigid Body Parameter UI

Motion types

Motion types are behaviors of the rigid body. There are 3 types: **Dynamic**, **Keyframed**, **Static**.



Motion types Parameter

Dynamic

Dynamic motion rigid bodies obey the physical simulation. Note that ONLY dynamic rigid bodies can be baked to keyframes. Don't make dynamic objects child layers of any other layer. Because the keyframes are plot as it is assumed that the rigid bodies have no parent layer.

Keyframed

Keyframed motion type rigid bodies obey any After Effects keyframed motion. They collide

with Dynamic types. Keyframed type rigid bodies are set mass infinite. So the dynamic objects, with finite mass, can not affect motion of the keyframed type.

Static

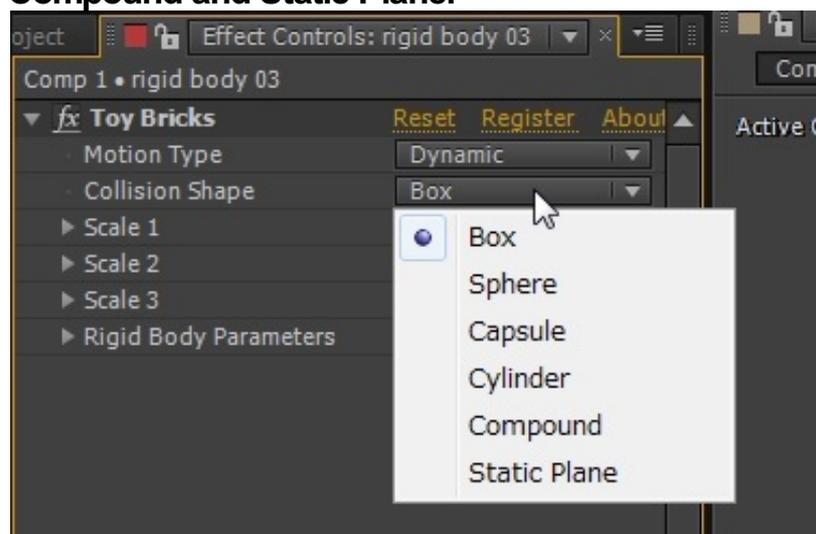
Static motion type rigid bodies remain static through out the simulation. Some shapes are able to be used only with static motion type.

Position and rotation

The rigid body position and rotation are controlled by the null layer. If the motion type is Dynamic, the rigid body inherits the state of the null layer when the simulation starts. If set to "Keyframed", the rigid body inherits the state of the null layer during the simulation. If set to "Static", the rigid body stays on state of the null layer when simulation is set.

Shapes

The Collision Shape parameter allows you to choose the shape of the rigid body: **Box, Sphere, Capsule, Cylinder, Compound and Static Plane.**



Collision Shape parameter.

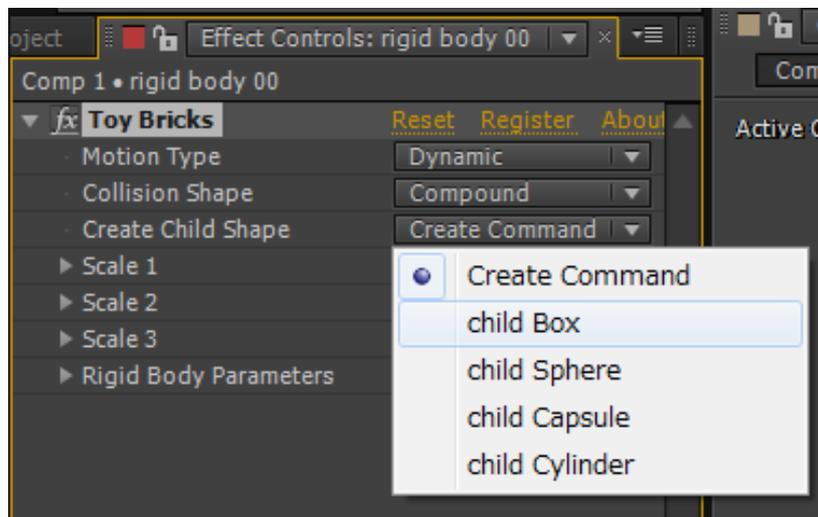
Shapes and size parameters

Shape	Scale 1	Scale 2	Scale 3
Box	width (x size)	height (y size)	depth (z size)
Sphere	radius	not used	not used
Capsule	length of axis	radius	not used
Cylinder	radius	length of axis	not used
Compound	not used	not used	not used
Static Plane	not used	not used	not used

Compound Shape

Compound shape is a compound of other primitives.

If compound shape is chosen, the **Create Child Shape** command is shown.



Create Child Shape command

This command generates a 3D null layer with the child shape. This child shape is valid as the child of the compound shape only if this null layer remains a child layer of the 3D null layer with the compound shape rigid body.

Rigid Body Parameters

You can control the physical property of the rigid body with the Rigid Body Parameters.

Mass

Mass of the rigid body. Valid only for Dynamic motion type. Keyframed and Static types have infinite mass.

Friction/Restitution

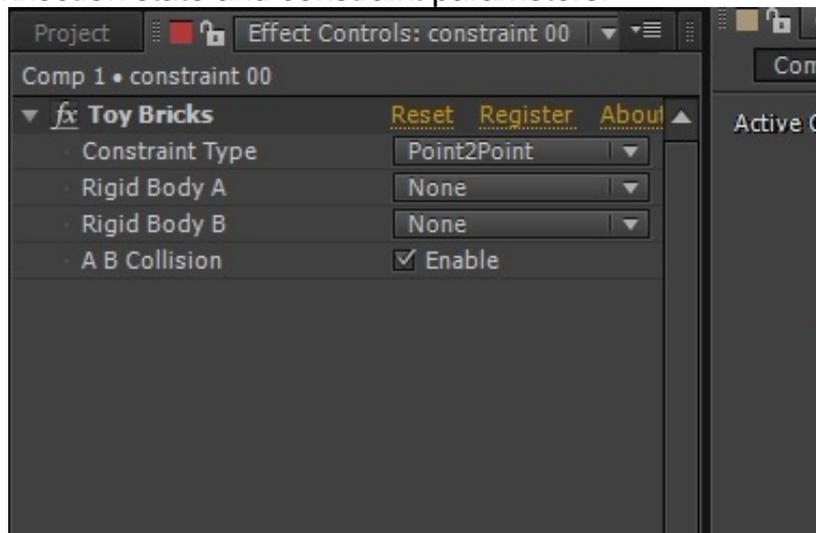
Friction/Restitution of the rigid body. Note that friction/restitution is interactive, so the effect is proportional to the multiple of the two rigid bodies: If you make friction/restitution effects between rigid bodies, let BOTH of the rigid bodies have the friction/restitution value not zero.

Velocity/Spin Damping

Damping factors. The higher value brakes the motion more effectively.

Constraint

Constraint is a 3D null layer generated by [World](#).
Set rigid bodies, connection state and constraint parameters.



Constraint Parameter UI

Constraint Mode

There two constraint modes: **Binded**, **Free**.

Binded Mode

If both Rigid Body A and Rigid Body B are set to valid rigid bodies, then constraint is mode "Binded". The Binded mode constraint connects two rigid bodies, and the connection position is set as position of the 3D null layer when the simulation starts.

Free Mode

If Rigid Body B is not set or invalid and Rigid Body A is set to a valid rigid body, then constraint is mode "Free". The rigid body A is constrained by the null layer of the chose constraint type. You can control the 3D constraint null layer during the simulation.

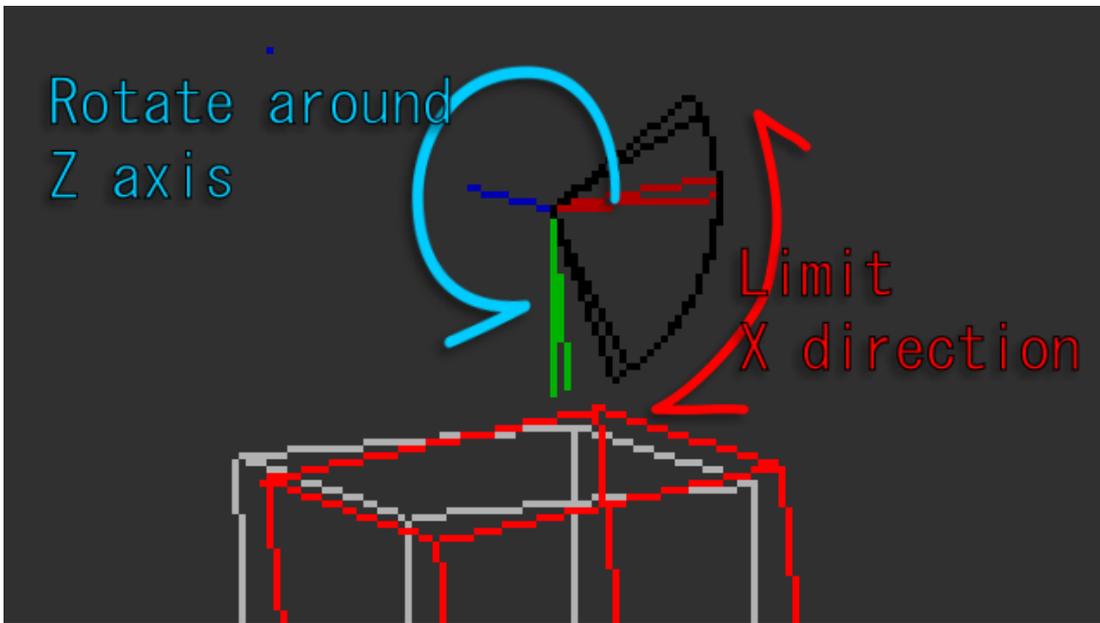
Constraint Type

Point2Point

Point2Point type constraint keeps the distance between constraint and rigid body. The connection can rotate freely.

Hinge

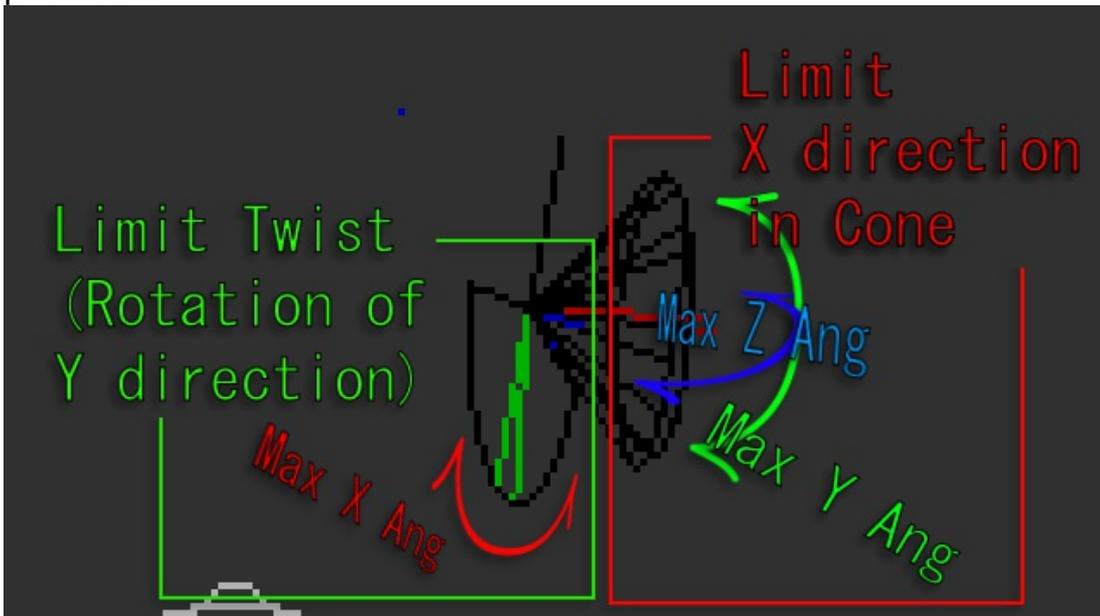
Keeps the distance, and limits rotation around the Z axis of the constraint 3D null layer. The rotation angle (the direction of X axis) is also limited by the parameters.



The limit is valid only if the parameters are in $-180 < (\text{Min Z Ang}) < (\text{Max Z Ang}) < 180$. Otherwise, there is no rotation limit.

Cone Twist

Keeps the distance between the bodies and limits the X direction in a Cone and also limits twist. Cone is constructed by Max Y Ang and Max Z Ang parameters. Twist is limited by Max X Ang parameter.



Gen6Dof

Generally 6 Degrees of freedom

Controls all distance and rotation limits. Each limit is valid if Min is less than Max. If Min is equal to Max then the control is fixed to that value, and if Min is greater than Max then the control is not limited.

Other Parameters

A B Collision

Switch an activation the collision between Rigid Body A and Rigid Body B. If you connect overlapped rigid bodies, switch off this.

Toy Bricks User's Manual
version 1.0

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Supports, bug reports and request ... mail to:koizumim83@gmail.com