Bullet Solver

- default solver in Houdini
- more powerful in H13 convex and concave options!
- works well with low res geometry that are not tightly packed

Today examine some essential parameters

- Tip: left to right matters in dops
- Tip: turn off **convex hull** when necessary

Example of ball falling into a box (sidefx forum post)



above: default convex hull below: concave



In version 13 ... on the object node under Collisions/Bullet Data change the selection to **Concave**

| Static Object bo | x_object1 | | | | | Ser and | H | | 2 |
|-----------------------|----------------|----------------|-----------------------|---------------------|--------|------------|---------|------|------------|
| | Creatio | n Frame Spe | cifies Simu | lation Frame | | | | | |
| Creation Frame | 1 | | | | | | | | - |
| Object Name | \$05 | | | | | | | | |
| SOP Path | `opinput | path("/obj | /box_obje | ctl/attribcrea | tel", | 0)` | | ഖ | * |
| OBJ Path | /obj/box | _object1 | | | | | | പ | \$ |
| | Use Def | forming Geo | metry | | | | | | |
| | 🖌 Use Obj | ject Transfor | m | | | | | | |
| | Create | Active Objec | t | | | | | | |
| | Ignore I | Merge Relati | onships | | | | | | |
| | ✓ Display | Geometry | | | | | | | |
| Physical Collisions | | | | | | | | | |
| RBD Solver Bullet Da | ata ODE P | Primitive | otra | | | | | | |
| Color | V SHOW | 0 | ieu y | 0 | · | 1 | | | |
| Deactivated Color | | 1 | | 0 | | - 0 | | | ╣║ |
| | | - | | Ŭ | | | | | -11 |
| Geometry Benrese | Concav | | | | | | | | |
| debilled y hepitise | Creat | e Convex H | Per Set 0 | of Connected Primi | itives | | | | |
| | AutoF | it Primitive E | loxes, Caps | sules, Cylinders, S | pheres | , or Plane | es to (| Geo | |
| Position | | | | | | | | | - |
| /abi/AutaDanNetwork X | Tree View | X Material | ▲ :::::: Palette X | Asset Browser X | Ð | | | | |
| 👍 🛋 🎬 obi 🖉 | AutoDopNe | etwork | | | | | -6 | 6 | 6 |
| | | | | | | | | 0 | See. |
| | | | | 8 | | L == # | 5 ₩ | Q | , • |
| | | | | | | | Dy | /nan | nics |
| | | box_object1 | | | | | | | |
| | | | | sphere_object1 | | | | | |
| | 1 - | merge3 | | | | | | | |
| | | | 1 9 | merge2 | | | | | |
| | T e | staticsolver1 | | | | | | | |
| | 7 | | - | rigidbodysolver1 | | | | | |
| | | | | | | | | | |
| | | | mergel | | | | | | |
| | | / | | No | n-Co | mmer | cial | Edit | tion |
| | 102 | | 716 | | | | | | |



above: checked below: unchecked



In version 12.5... this used to be the checkbox Polygons as Convex Hulls



Masterclass on Bullet 12.5 and 13.0 a must watch first covers:

- Pre-fractured and Dynamically Fractured RBDs
- Modifying Bullet Simulations
- Adding and Modifying Glue Constraint Networks
- Adding Force Constraints
- Interaction with Other Solvers: FLIP, Cloth
- Bullet Limitations in H12.1
- Bullet Building Destruction Example

things to know about the bullet solver

| RBD Object sphe | re_object1 👸 H 🕖 🥝 | | | | | |
|------------------------|--|--|--|--|--|--|
| Number of Objects | 1 | | | | | |
| Object Name | \$0S | | | | | |
| | Solve on Creation Frame | | | | | |
| SOP Path | `opinputpath("/obj/sphere_objectl/dopimportl", θ)` 🔂 🛱 | | | | | |
| | Use Deforming Geometry | | | | | |
| | 🗹 Use Object Transform | | | | | |
| | Y Create Active Object | | | | | |
| | Display Geometry | | | | | |
| Initial State Glue Co | ollisions Physical | | | | | |
| | Compute Center of Mass | | | | | |
| Center of Mass | θ 1.13487 θ | | | | | |
| | ✔ Compute Mass | | | | | |
| Density | 1000 [| | | | | |
| Mass | 1 | | | | | |
| Rotational Stiffness | | | | | | |
| Bounce | 0.5 | | | | | |
| Friction | 1 | | | | | |
| Dynamic Friction Sc | 1 | | | | | |
| Temperature | 0 | | | | | |
| | | | | | | |

on the RBD object

Physical tab

this defines how they react when collisions happen

| RBD Object sphere | re_object1 | | | _ 🔅 H 🛈 📀 | | |
|--------------------------|---------------|----------------------|-------------------------|----------------------|--|--|
| | ✓ Use Object | Transform | | | | |
| [| Create Acti | ve Object | | | | |
| [| 🖌 Display Ge | ometry | | | | |
| Initial State Glue Co | llisions Phys | ical | | | | |
| RBD Solver Bullet Da | ta ODE Prim | itive | | | | |
| Show Guide Geometry | | | | | | |
| Color | 0 | | 0 | 1 | | |
| Deactivated Color | 1 | | 0 | 0 | | |
| | | | | | | |
| Geometry Represe | Convex Hu | II 🔶 | | | | |
| | Create Co | onvex Hull Per Set (| Of Connected Primitive | s | | |
| | 🖋 AutoFit Pr | imitive Boxes, Cap | sules, Cylinders, Spher | es, or Planes to Geo | | |
| Position | | | | | | |
| Rotation | | | | | | |
| Box Size | 1 | 1 | 1 | | | |
| Radius | 1 | | | | | |
| Length | 1 | | | | | |
| Collision Padding | 0.02 | | | | | |
| | Shrink Co | llision Geometry | | 4 | | |

Collisions/Bullet Data

Collisions tab contains parameters for collisions (used to be "As is" in H12.5) Now in H13 for this example: **Convex Hull** works or **Sphere**

Select option as appropriate

Collision Padding – default is .02 0 is most accurate but you may see popping of resting geometry

Solver clarification

Often you will see:

rbdsovler node – many tutorials etc.

rigidbodysolver node – you can select

If you dive inside the rigidbodysolver, you will see that it is simply a selection of the different types of solvers So if you want bullet (popular now) just bring down the bulletsolver node

When building your own – don't hesitate to look at the shelf tools to confirm proper usage

Hungry Hippo Example

| | r rigidbodysolverl | 😂 H 🕖 | | | |
|---------------------|------------------------------------|-------|--|--|--|
| Solver Engine | RBD 🔶 | | | | |
| Bullet ODE RBD Fr | acture | | | | |
| Substeps Collisions | | | | | |
| Collision Passes | 5 | | | | |
| Contact Passes | 7 | -] | | | |
| SubContact Passes | 10 | | | | |
| Shock Propagation | 3 | | | | |
| Resolve Penetration | | | | | |
| | Use Point Velocity for Collisions | | | | |
| | Use Volume Velocity for Collisions | | | | |
| | 🗹 Add Impact Data | | | | |
| | 🗹 Glue Ignores Resting Objects | | | | |
| Culling Method | Sphere 🔶 | | | | |
| Contact Grouping | None | | | | |

On the RBD solver, there are two checkboxes to be aware of with regard to collisions

Use Point Velocity for Collisions Use Volume Velocity for Collisions

In this case, one needed to be checked (either – first is better, second works too) so the collision calculation was correct

As it turns out, bullet was a better choice.

Start on Exercise 1