Computer graphics

Three.js

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April 27, 2021

Overview

1. Three.js
   - Textures
   - Shadows
   - Load models
   - Bouncing ball
   - Interactions

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Textures

```
1  // texture
   const loader = new THREE.TextureLoader();
3  const texture = loader.load( 'textures/texture_1.jpg' );
   var material = new THREE.MeshPhongMaterial(
5                     {map: texture }
                  );
7
   var geometry_cube = new THREE.BoxGeometry(2, 2, 2);
9  var cube = new THREE.Mesh( geometry_cube, material );
   scene.add(cube);
11
```

Example: 7_textures.html

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Textures

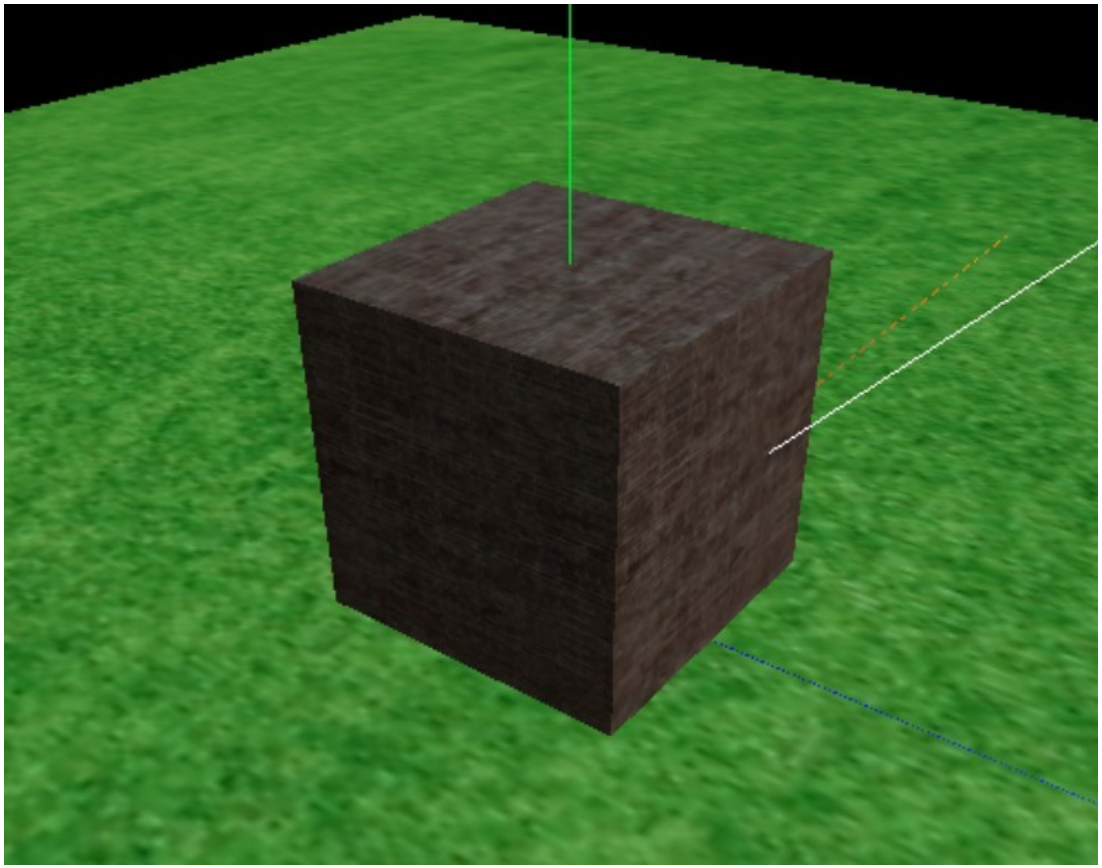

Figure: Three.js texture example.

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Shadows

We must enabled shadows in the renderer

```
renderer.shadowMapEnabled = true;
renderer.shadowMap.type = THREE.PCFShadowMap;
```

Also: light.castShadow

```
const light = new THREE.DirectionalLight(0xFFFFFF, 1);
light.castShadow = true;
```

Then, we must especified the objects that cast and receive shadows.

```
cube.castShadow = true;
plane.receiveShadow = true;
```

Example: 8_shading.html

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Shadows

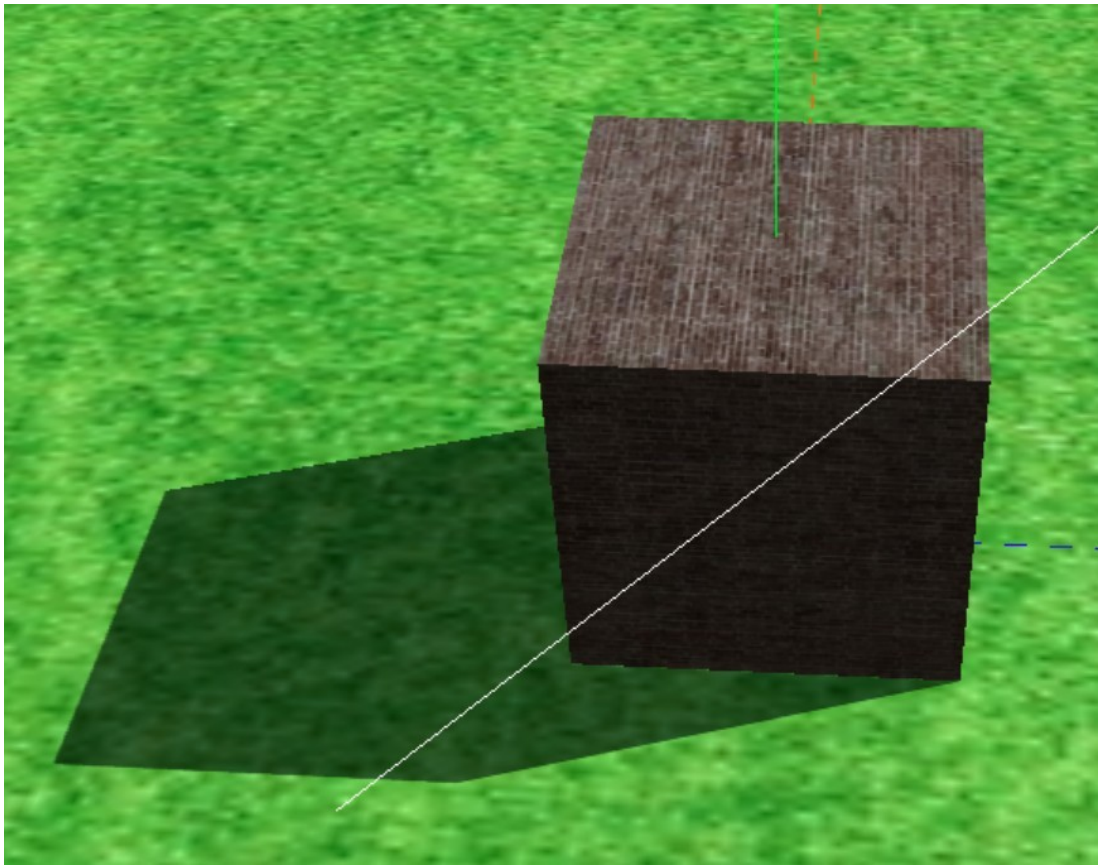

Figure: Three.js shadow example.

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Load models

There are tools like Blender, Vectary, etc. designed for 3D modeling and rendering. We could use these tools and export the models into Three.js.

Also, there are web pages where you can download models: STLFinder.

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Load models

Formats

- OBJ.- Standar to storage points and vector.
- MTL.- Use to store materials.
- STL.- Use for 3D printing.
- ...

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Load models

STLLoader

Import STLLoader:

```
import {STLLoader} from './jsm/STLLoader.js';
```

Load the STL model:

```
var loader = new STLLoader();
loader.load( 'models/dragon.stl', function ( geometry ) {
  var material = new THREE.MeshLambertMaterial(
                 {color:0x00FF00}
  );
  var mesh = new THREE.Mesh( geometry, material );
  scene.add( mesh );
});
```

Example: 9_loading_models.html

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Load models

OBJLoadery MTLLoader

Import OBJLoader:

```
import {OBJLoader} from './jsm/OBJLoader.js';
import {MTLLoader} from './jsm/MTLLoader.js';

```

Load the model:

```
var mtlLoader = new MTLLoader();
mtlLoader.load('models/poliedro.mtl', function(materials){
  materials.preload();
  var objLoader = new OBJLoader();
    objLoader.setMaterials( materials );
    objLoader.load( 'models/poliedro.obj', function(object)
    {
    object.position.set(5, -7, -10);
    scene.add( object );
  });
});

```

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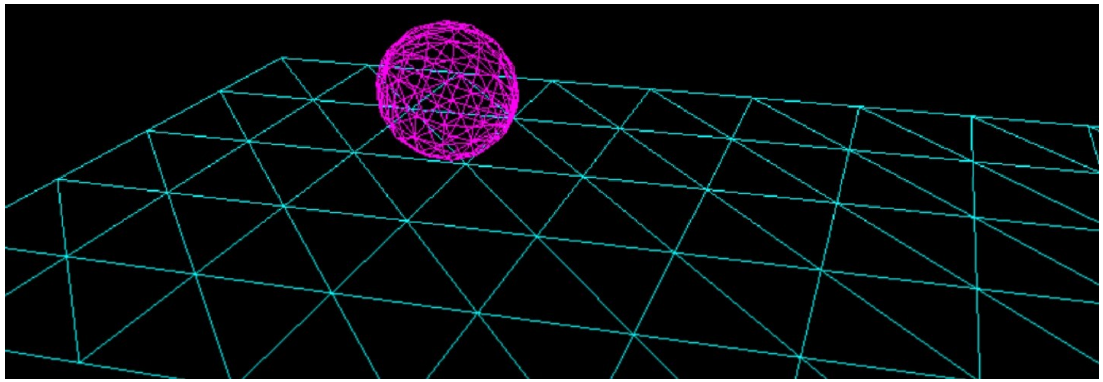
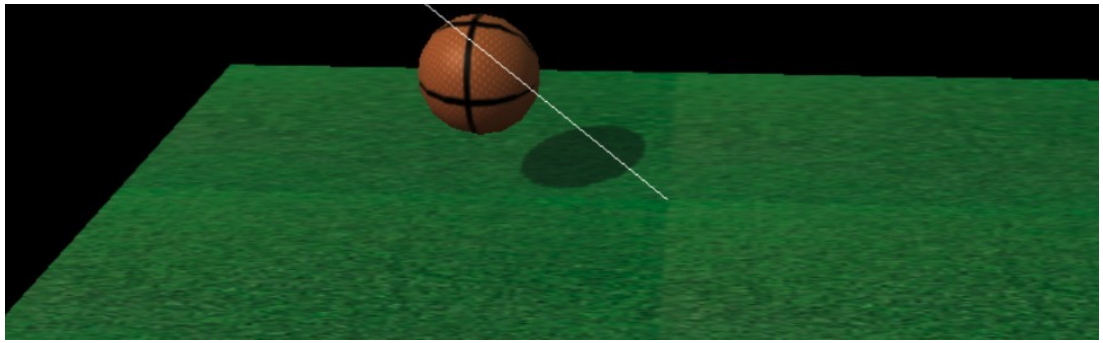
Bouncing ball

See examples *10_bouncing_ball.html* and *11_bouncing_ball_2.html*.





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Interactions

Download three.interactions from: Enlace

Import Interaction:

```
import {Interaction} from './jsm/three.interaction.module.
    js';
```

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Interactions

```
var interaction = new Interaction(renderer, scene, camera);

cube.cursor = 'pointer';
cube.on('click', function(ev) {});
cube.on('touchstart', function(ev) {});
cube.on('touchcancel', function(ev) {});
cube.on('touchmove', function(ev) {});
cube.on('touchend', function(ev) {});
cube.on('mousedown', function(ev) {});
cube.on('mouseout', function(ev) {});
cube.on('mouseover', function(ev) {});
cube.on('mousemove', function(ev) {});
cube.on('mouseup', function(ev) {});

```

Example: 12_interactions.html
More examples: Enlace

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Questions?

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