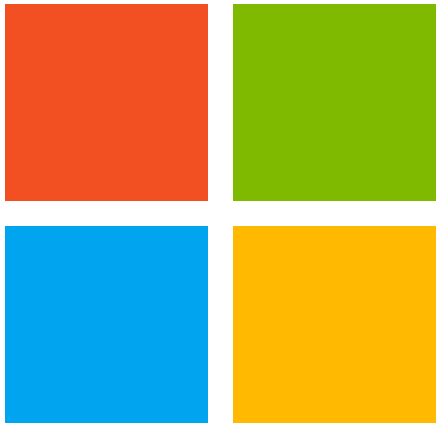


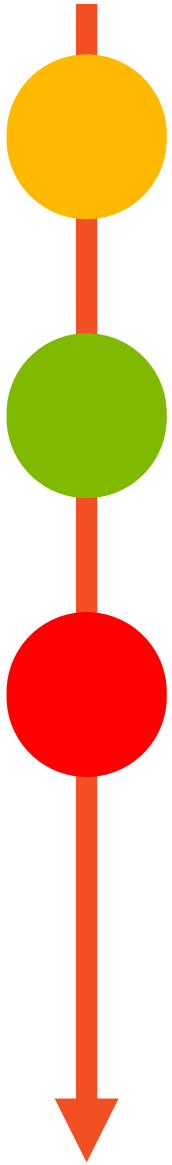
2019 TJMSC Tech. Courses

Web3D

Xue Piao
Tongji Microsoft Student Club

May 25, 2019
Room 101, North Building
SSE, Tongji Univ

同济微软俱乐部
Tongji Microsoft Student Club



Brief usage of JavaScript

Create your first Web3D scene

Introduction of basic module in Three.JS

Most materials are referenced from CS451, David Kauchak

Brief usage of JavaScript

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JavaScript:

●JavaScript is the programming language of the Web.
● All modern HTML pages use JavaScript.
● After JavaScript is inserted into the HTML page, all mod ern browsers are available.

Three parts of Web：

- **HTML** defines the content of the web page
- **CSS** describes the layout of the web page
- **JavaScript** describes page behavior

Brief usage of JavaScript

JavaScript Usage：

The script in the HTML must be between the <script> and </script> tags.

Scripts can be placed in the <body> and <head> sections of the HTML page.

To insert JavaScript into an HTML page, use the <script> tag.

<script> and </script> tell JavaScript where to start and end.

The line of code between <script> and </script> contains JavaScript.

You can place an unlimited number of scripts in your HTML document.

The script can be in the <body> or <head> section of the HTML, or both.

The usual practice is to put the function in the <head> section or at the bottom of the page. This allows the m to be placed in the same location without disturbing the content of the page.

Brief usage of JavaScript

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JavaScript functions in <head>

源代码:

点击运行

```
<!DOCTYPE html>
<html>
<head>
<meta charset="utf-8">
<title>HelloWorld</title>
<script>
function myFunction(){
    document.getElementById("demo").innerHTML="我的第一个 JavaScript 函数";
}
</script>
</head>
<body>

<h1>我的 Web 页面</h1>
<p id="demo">一个段落。</p>
<button type="button" onclick="myFunction()">点击这里</button>

</body>
</html>
```

运行结果

我的 Web 页面

一个段落。

点击这里

Brief usage of JavaScript

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JavaScript functions in <body>

源代码:

点击运行

```
<!DOCTYPE html>
<html>
<head>
<meta charset="utf-8">
<title>HelloWorld</title>
</head>
<body>

<h1>我的第一个 Web 页面</h1>
<p id="demo">一个段落。</p>
<button type="button" onclick="myFunction()">点击这里</button>
<script>
function myFunction(){
    document.getElementById("demo").innerHTML="我的第一个 JavaScript 函数";
}
</script>

</body>
</html>
```

运行结果

我的第一个 Web 页面

一个段落。

点击这里

Brief usage of JavaScript

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External JavaScript

源代码:

点击运行

```
<!DOCTYPE html>
<html>
<head>
<meta charset="utf-8">
<title>HelloWorld</title>
</head>
<body>

<h1>我的 Web 页面</h1>
<p id="demo">一个段落。</p>
<button type="button" onclick="myFunction()">点击这里</button>
<p><b>注释：</b>myFunction 保存在名为 "myScript.js" 的外部文件中。</p>
<script src="myScript.js"></script>

</body>
</html>
```

运行结果

我的 Web 页面

一个段落。

点击这里

注释： myFunction 保存在名为 "myScript.js" 的外部文件中。

Create your first Web3D scene

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HTML5→ WebGL → Three.JS

Basically Three.js can run on any popular browser, except for most versions of IE. So if you want to use the old version of IE, you have two options: you can use Google Chrome Frame to support WebGL, which can be downloaded from

https://developers.google. com/chrome/chrome-frame/.

In addition to Google Chrome Frame, you can also use the iewebgl plugin, which is available at http://iewebgl.com/. Install this plugin on IE to support WebGL.

Create your first Web3D scene

Three.JS download:

https://github.com/mrdoob/three.js/tree/master/build

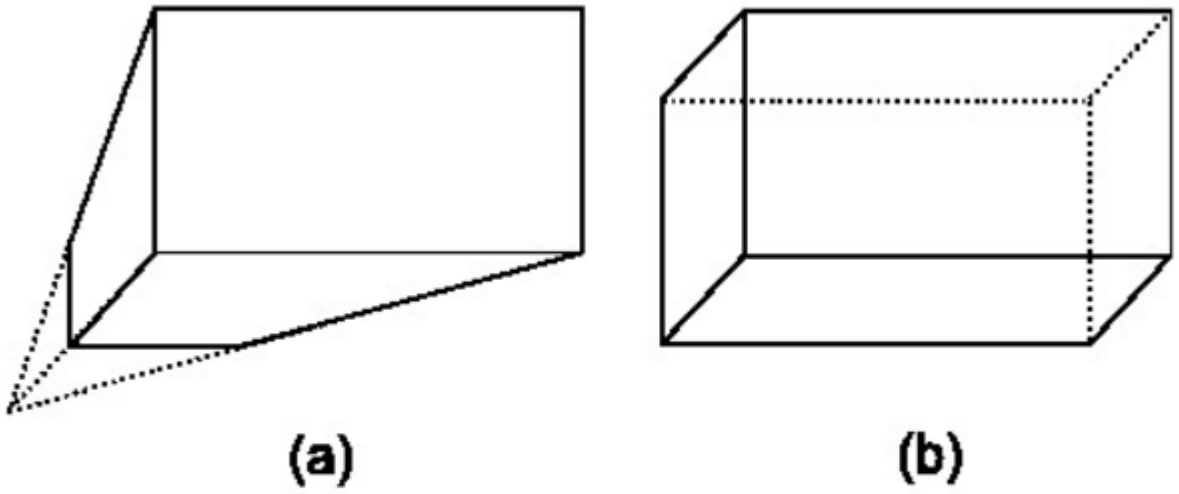
Three.JS frame:

https://github.com/Ovilia/ThreeExample.js/blob/master/Chapter1/1.2.1.html

Three.JS learning example:

https://github. com/josdirksen/learningthreejs

Camera:

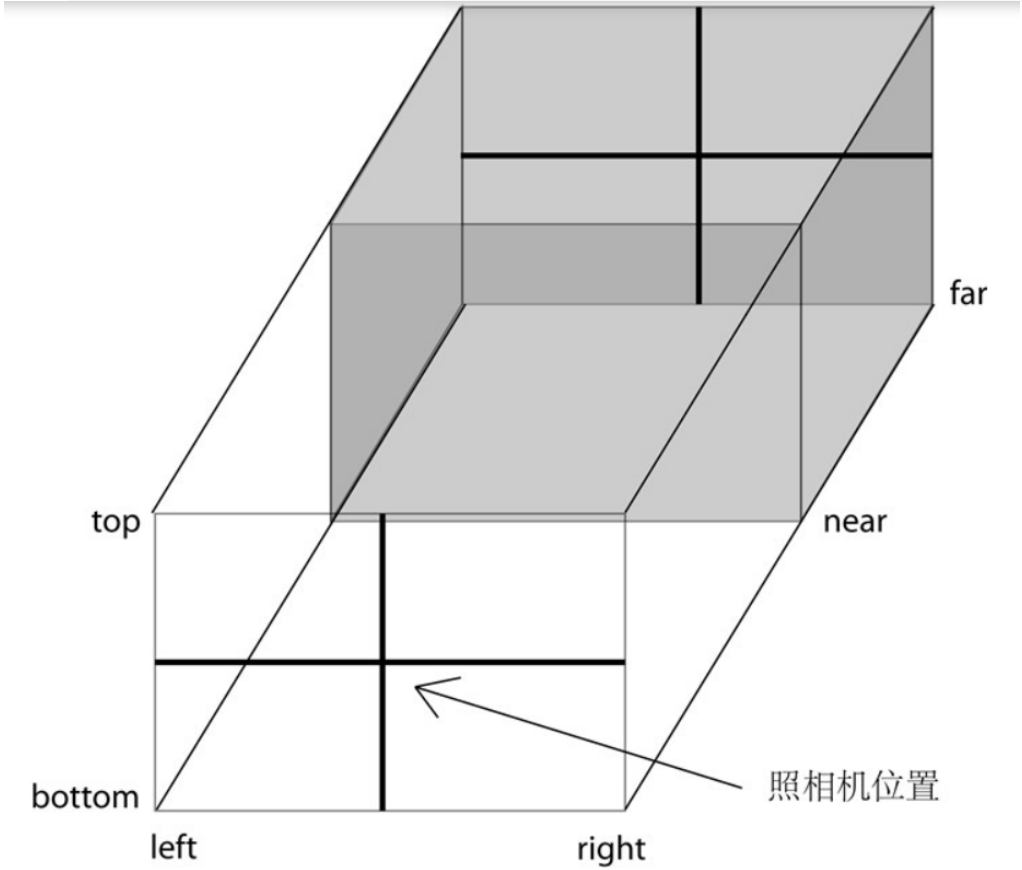


(a)透视投影，(b)正交投影

Introduction of basic module in Three.JS

Orthographic Camera:

```
THREE.OrthographicCamera(left, right, top, bottom, near, far)
```



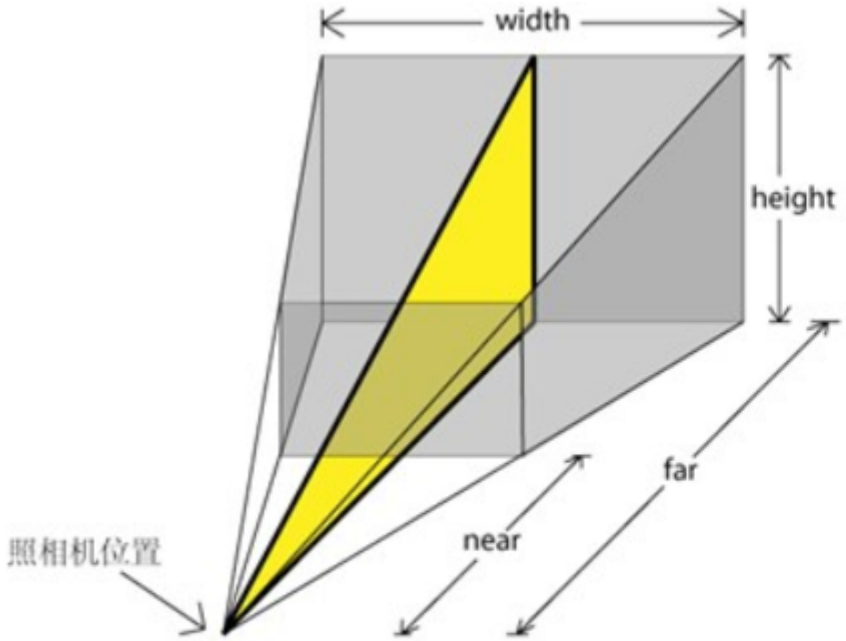

```
var camera = new THREE.OrthographicCamera(-2, 2, 1.5, -1.5, 1, 10);
camera.position.set(0, 0, 5);
scene.add(camera);
```

Introduction of basic module in Three.JS

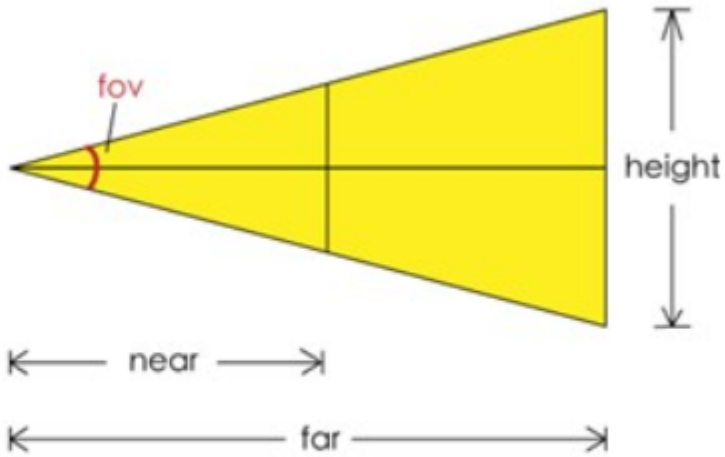
Perspective Camera

```
THREE.PerspectiveCamera(fov, aspect, near, far)
```

```
var camera = new THREE.PerspectiveCamera(45, 400 / 300, 1, 10);
camera.position.set(0, 0, 5);
scene.add(camera);
```



透视图



侧视图

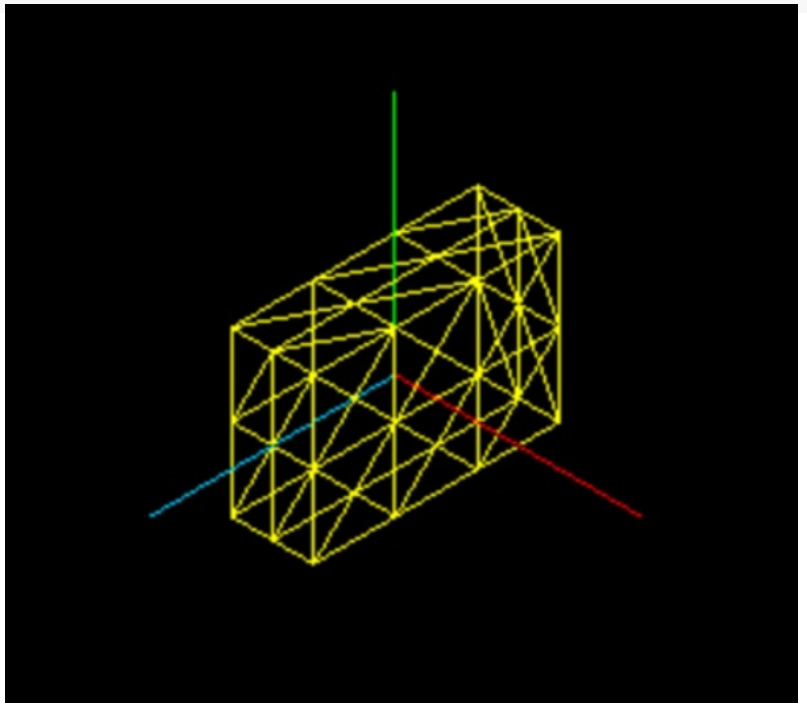
Introduction of basic module in Three.JS

Geometry:

CubeGeometry

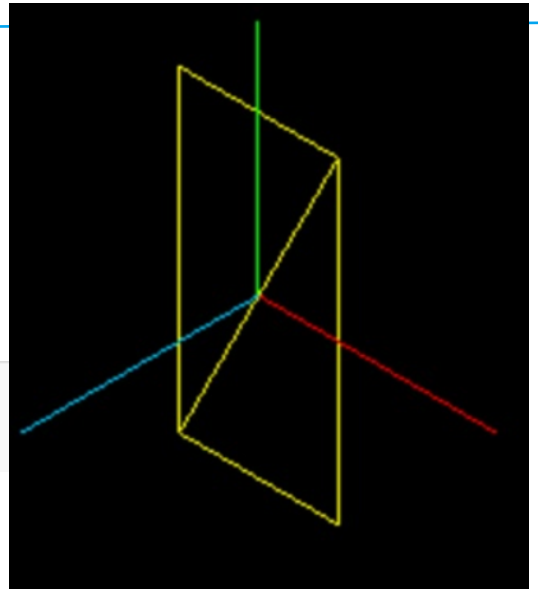
```
THREE.CubeGeometry(width, height, depth, widthSegments, heightSegments, depthSegments)
```

new THREE.CubeGeometry(1, 2, 3, 2, 2, 3)



Introduction of basic module in Three.JS

Geometry:

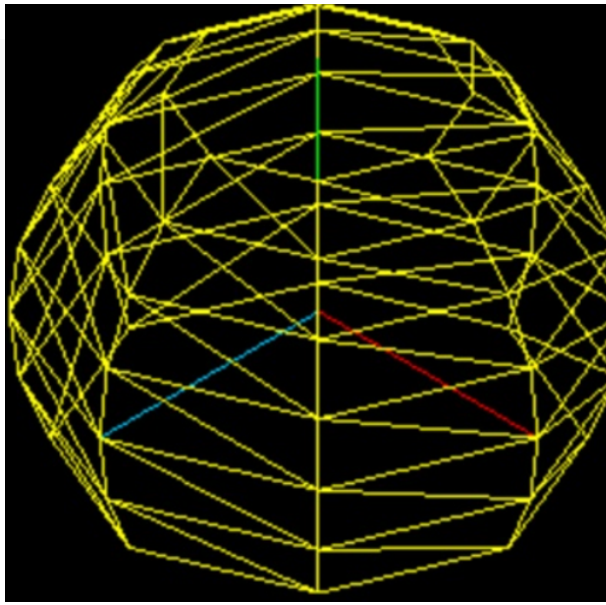


PlaneGeometry

```
THREE.PlaneGeometry(width, height, widthSegments, heightSegments)
```

SphereGeometry

```
THREE.SphereGeometry(radius, segmentsWidth, segmentsHeight, phiStart, phiLength, thetaStart, thet
aLength)
```

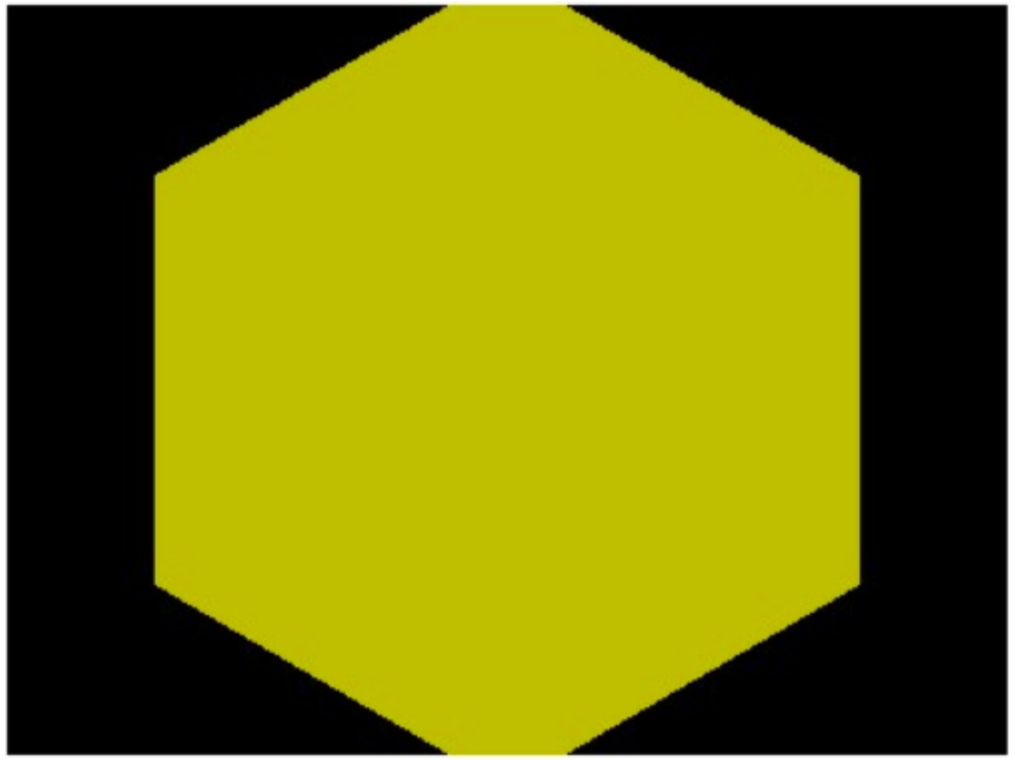


Introduction of basic module in Three.JS

BasicMaterial

```
THREE.MeshBasicMaterial(opt)
```

```
new THREE.MeshBasicMaterial({
    color: 0xffff00,
    opacity: 0.75
});
```



Introduction of basic module in Three.JS

MeshLambertMaterial

```
Idiffuse = Kd * Id * cos(theta)
```

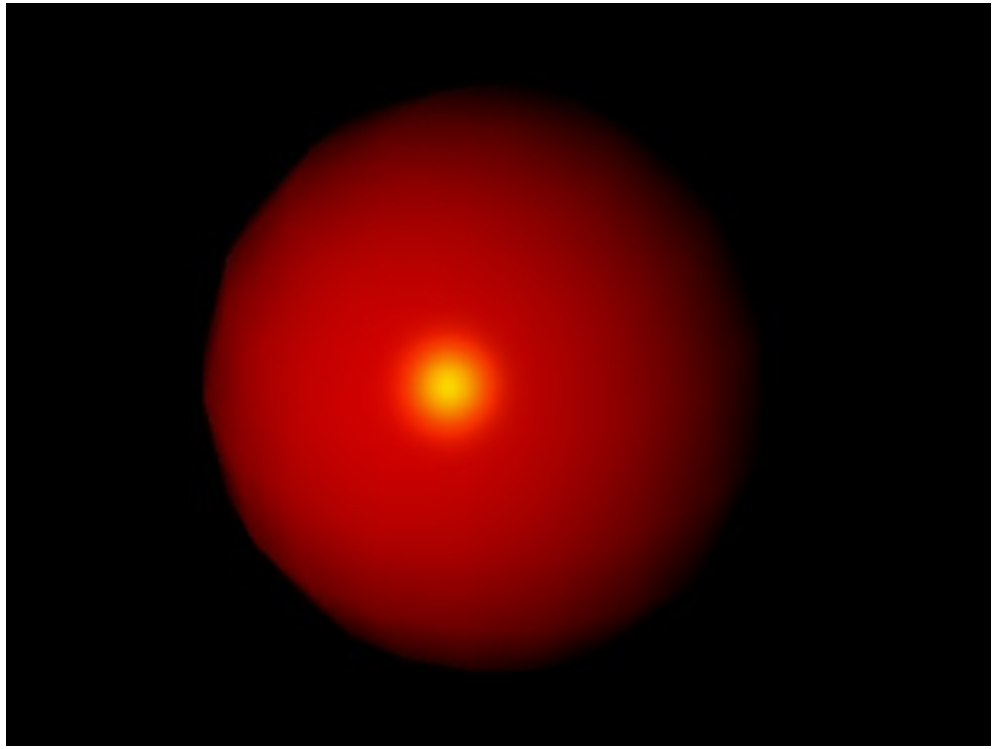
```
new THREE.MeshLambertMaterial({
    color: 0xffff00,
    emissive: 0xff0000
})
```

Introduction of basic module in Three.JS

MeshPhongMaterial

```
Ispecular = Ks * Is * (cos(alpha)) ^ n
```

```
material = new THREE.MeshPhongMaterial({
    color: 0xff0000,
    specular: 0xffff00,
    shininess: 100
});
```



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