Experiment-7

Link:- https://drive.google.com/file/d/1Vn861qv9Hr_0U-LC8jaB2A8bfUgfBR7Q/view?usp=sharing

Step 1: Create Rocket

Since I want to focus in this tutorial on the fire and smoke creation, I will just briefly go into the rocket modelling process.

- Be sure the 3d curser is in the center of the scene. Press Shift + S and Select *Cursor to Center*.
- The rocket will be created with a *Cone* as the starting point. Press Shift + A to open the *Mesh Menu* and select *Cone*. Change the vertices from 36 to 6.

- To bring the rocket into shape I have to extend the bottom part of the Cone. In Edit mode, select the lower ring of the Cone and press the E Key to *Extrude* the shape down.

- Now go to *Face* mode and select every other Face of the lower part. Under *Pivot Point* select *Individual Origins*, this is needed to extrude the wings out at once and not individually.
- To keep a good shape of the rocket first Inner Extrude the selected faces using the I Key and than press the E Key to Extrude the wings out. Finally move the extruded parts down using the Z axis (blue) handle.

- In order to smoothen the current low poly rocket shape I applied a *Subdivision Surface* Modifier. Click on the wrench icon in the *Properties* bar and select Subdivision Surface.

- Since the focus of this tutorial is the fire and smoke creation, I just added a simple exhaust to complete the rocket model. Let's move on now to the fun part.

Domain and Flow - A short introduction

Before I continue with the Tutorial I think it is useful to give a brief introduction of what **Domain** and **Flow** mean. On Blender.org is a good explanation of the concept.

The bounding box of the object serves as the boundary of the simulation. All fluid objects must be in the domain. Fluid objects outside the domain will not bake.

So Basically we need a **Box** (Domain) that defines the boundaries of the fire and smoke simulation and in this case a **Plane** (flow) that defines the starting point of the fire / smoke simulation.

Step2: Add Domain

As we learned a domain (box) is needed that defines the boundaries. Since we want to have the fire/smoke simulation underneath the Rocket I started with adding a regular cube and placed it under the rocket.

- Place the 3d cursor under the rocket and press Alt + A to open the Mesh Menu, select the *Cube*.
- Size the cube using the S Key until you are happy with the shape.
- In order to transform the Cube into a domain (where the action will happen), go to the *Physics* tab under *Properties* select **Smoke** and than **Domain**. You will see now that the cube will get transparent and only the edge lines remain visible.

Step3: Add Flow:

Now that a domain is defined as the bounding box for the fire and smoke simulation, the next action is to create the flow (plane) where the fire is coming from.

- Press Alt + A and select a **Plane**. Size the plane (S Key) and place it under the rocket exhaust within the domain.

- To assign flow to the plane go to the Properties Tab, than Physics - Smoke - Flow - Fire.

- If you press the Play button now you will see a flame going up as you would expect from fire and smoke. Since in our case however we need to the flame to flow downwards you need to change the following settings for the *Flow Plane* under **Initial Velocity**.

- Now rotate the Flow plane by 180 degree using the R Key so that the fire beam is pointing downwards. You can play with those values to increase the flame until you are happy with how it looks like.

Step4: Node Settings

The domain and flow related work is complete now but if you try and look how your model would look like at this point in rendered view (Shift + Z) you would most likely just see a cube like this.

The reason why this is happening is Blender is assigning a default Material Shader to the domain but in this case we need a **Volume Shader**. More information on this can be found on the Blender.org site.

In order to make the flame and smoke visible in the rendered image we need to make changes to the domain node.

- Make sure the Domain Box is selected.
- Open the **Node Editor**.

- Make the following changes. You can add nodes using Shift + A Keys.

- Back in 3D View, if you now press Shift-Z the box shouldn't be visible anymore and you can see the rendered flames.

Note: The quality of the image is not high yet since we just use a few sample runs for this view. We are getting now to the actual Render setup.

Step5: Render

Well done! The only thing left at this point is to add some light and render the scene. I just added a plane and a few Emission light sources. You can actually apply UV mapping and add textures to the rocket and ground. I will cover a tutorial on Rendering in a separate tutorial soon.