

# Use of the Features of Dynamics and Visor to Simulate Group of Three Dimensional Swarm of Fishes in an Underwater Environment in the Autodesk Maya Software

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## Abstract

Dynamics and visor are considered as the engine and features, respectively, in Maya software. Dynamics engine is used to simulate objects controlled by the real world principles of physics and it gives object life and visor contains bundles of effects, assets to simulate many realistic environments like ocean, hills, trees, birds etc. They are found to be popular due to their highly interactive user interface and easy operational procedures. In this paper we have studied the movement of swarm of fishes in an underwater environment by using Maya software. We have presented some experimental techniques to show the effects of Dynamic engine and visor features on the animated version of fish movement. The output images have been found to possess more realistic attributes available in nature.

## Keywords:

Dynamics, Visor, Simulation, Ocean, 3D fish

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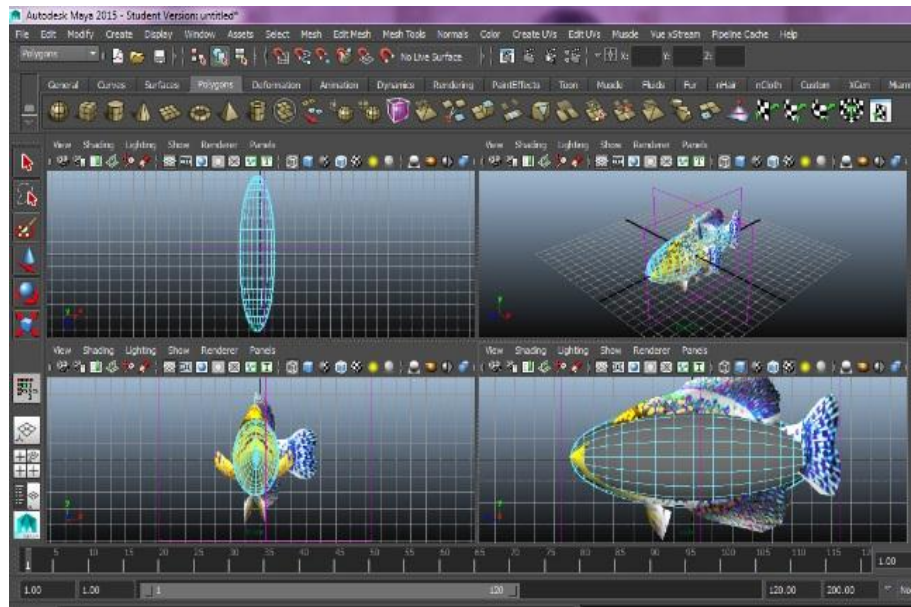
## Introduction

Shooting for the movie scenes or the television advertisement with the real environment like ocean and real objects like fishes on the real environment is difficult from technological point of view, time consuming and involves higher cost of production. The spending of money, time and labor of making such scenes can be reduced if we can use a software which can simulate real time environment and physical movement of animate beings. Maya dynamic engine [1], [11], [12], [13], [14] is capable to create real life physical simulation of an object by following the laws of physics. Dynamic animation uses real world principles to simulate natural forces to give motion to an object. We have specified the details how the object will behave and then software makes the decision how to animate the object. With Maya Dynamics we can animate particles [2], use gravity [3] and other force fields to move particles and implement some other properties. It creates real world scenario of three dimensional fishes by using surface flow effects of water. Visor [4], [12], [13], [14] contains inbuilt packages of assets, poses, presets and effects to create high quality objects and realistic three dimensional (3D) natural environments. Its ocean package [5] allow users to simulate realistic animated ocean in a short period of time. The speed of rendering [6] is found to be fast and gives detailed and larger images of water. These vast engine and features do not only make particle animation and ocean creation but also provide different types of simulation and effects like gravity, collision [7] by Maya Dynamics and visor offers paint effects [8], poses regarding the animated images.

Before designing, the Autodesk Maya student version 2015 [9] is installed in the personal computer which configuration is Intel core i7 processor, 8 GB RAM, 2 GB NVidia GPU, 1 TB HDD to carry out the present study.

## Modeling steps

The following steps are adopted to realize the animated version of the movement of a swarm of fishes. Various options in the Maya software have been utilized step by step to reach the final shape of our desired animated images. In order to accomplish this, we have created a new file on Maya and save it as fish.ma. At first, we import two reference images [10] to design the fish model.



*Figure 1. imported front and side views of fish image and modifying polygon sphere*

One image is for the front view and another one is for the side view of the fish. Then we create a polygon sphere on the grid and adjust its dimension according to our blue prints. We then modify the face, edge, vertex of the polygon objects by extrude component and by using other options to modify the geometrical shape to design it as a fish. In the same way, we create another polygon sphere to design the fish eyes. The imported front and side views of fish image and modifying polygon sphere is shown in figure 1.

After fish modeling, we texture the model by hypershade option from rendering editors of window menu. We click on lambert option, then double click on the work area of common materials attribute of Maya software. The Lambert option for texturing of Fish model is shown in figure 2.

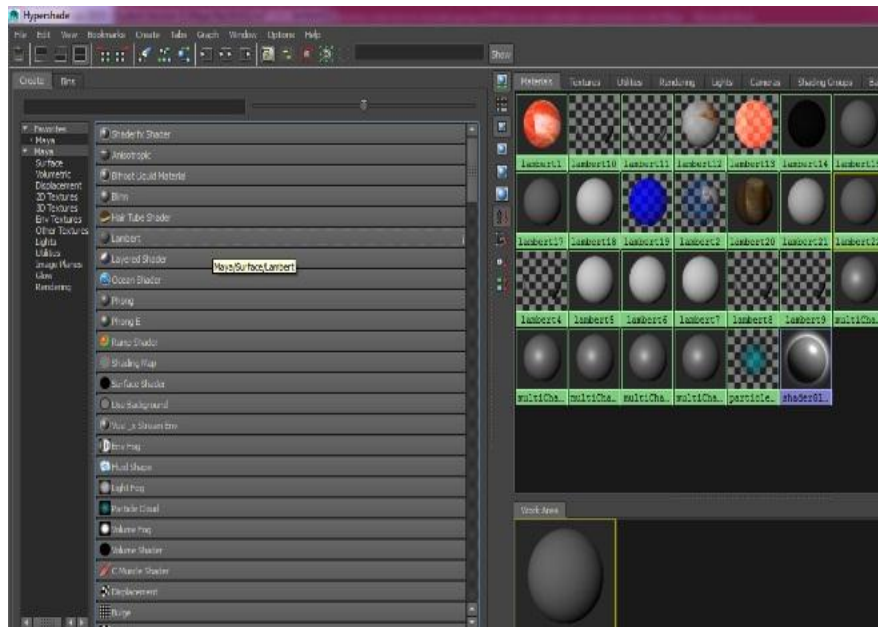


Figure 2. Lambert option for texturing of Fish model

We select the desired texture file by clicking on the file option. It displays a dialog box to select a texture file. In figure 3 texture file selection method is shown.

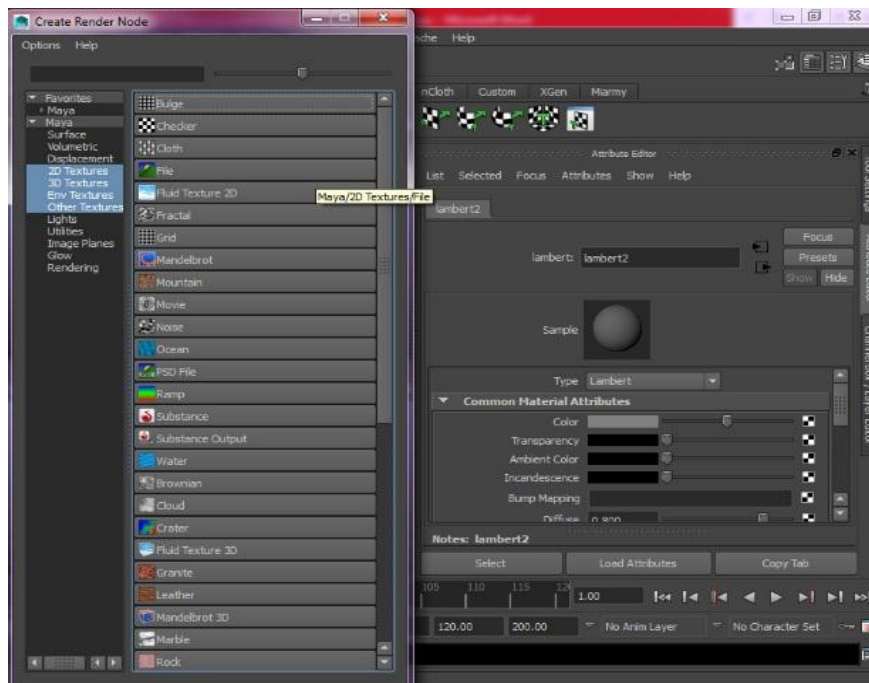
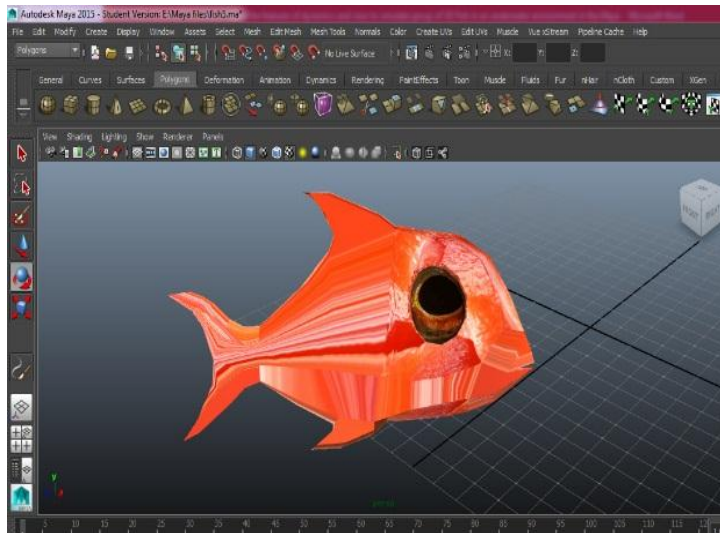


Figure 3. Texture file selection for three dimensional fish

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The figure 4 shows the textured fish model.



*Figure 4: Textured fish.*

The figure 5 shows a rendered fish image.



*Figure 5: Rendered fish image.*



Then we draw a path by CV curve tool of create menu. A group of fish will run through this path. We select CV curve tool from create menu option. The figure 6 shows the use of CV curve tool.

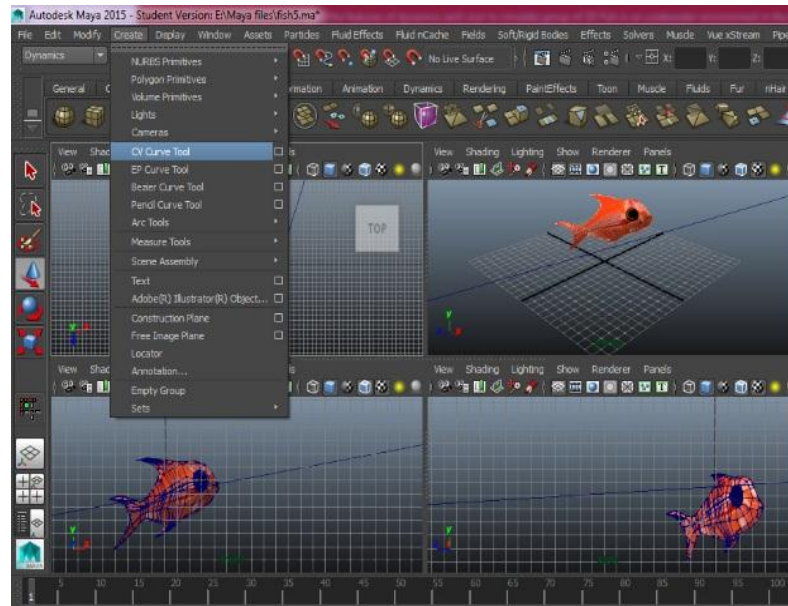


Figure 6. Use of CV Curve tool in Dynamics engine

Then we choose Dynamic engine and choose create curve flow from effect menu. This create animated particles which moves through our drawn path.

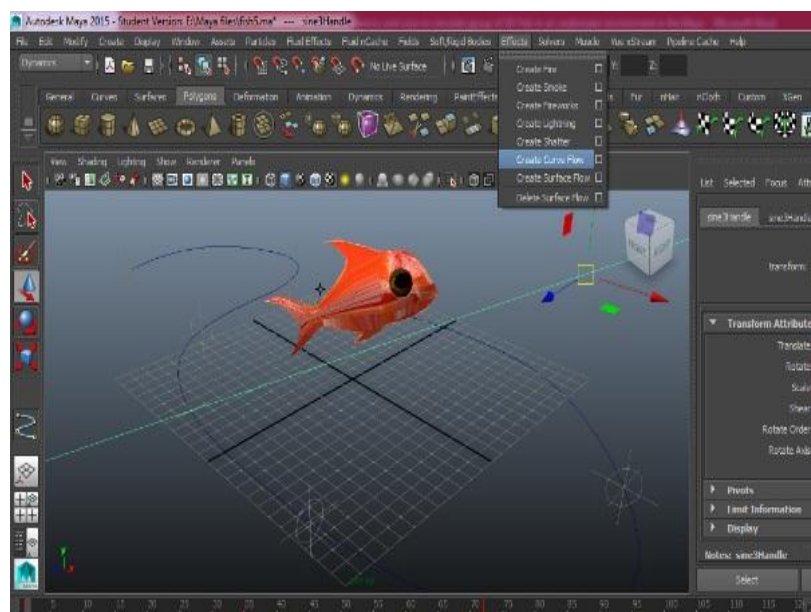


Figure 7: selecting create curve flow.

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We open the particle instancer options from particle menu and create it by adjusting appropriate parameters. The figure 8 shows particle instancer options parameters.

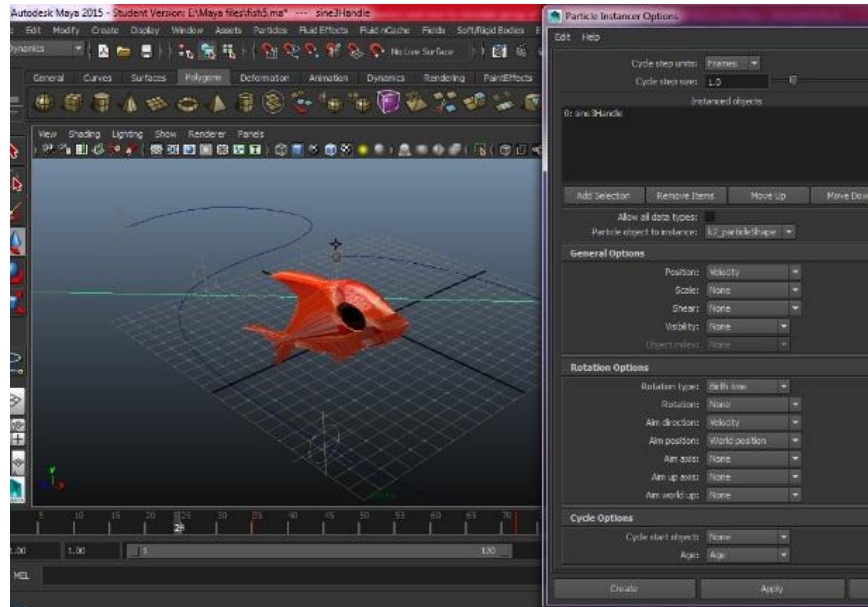
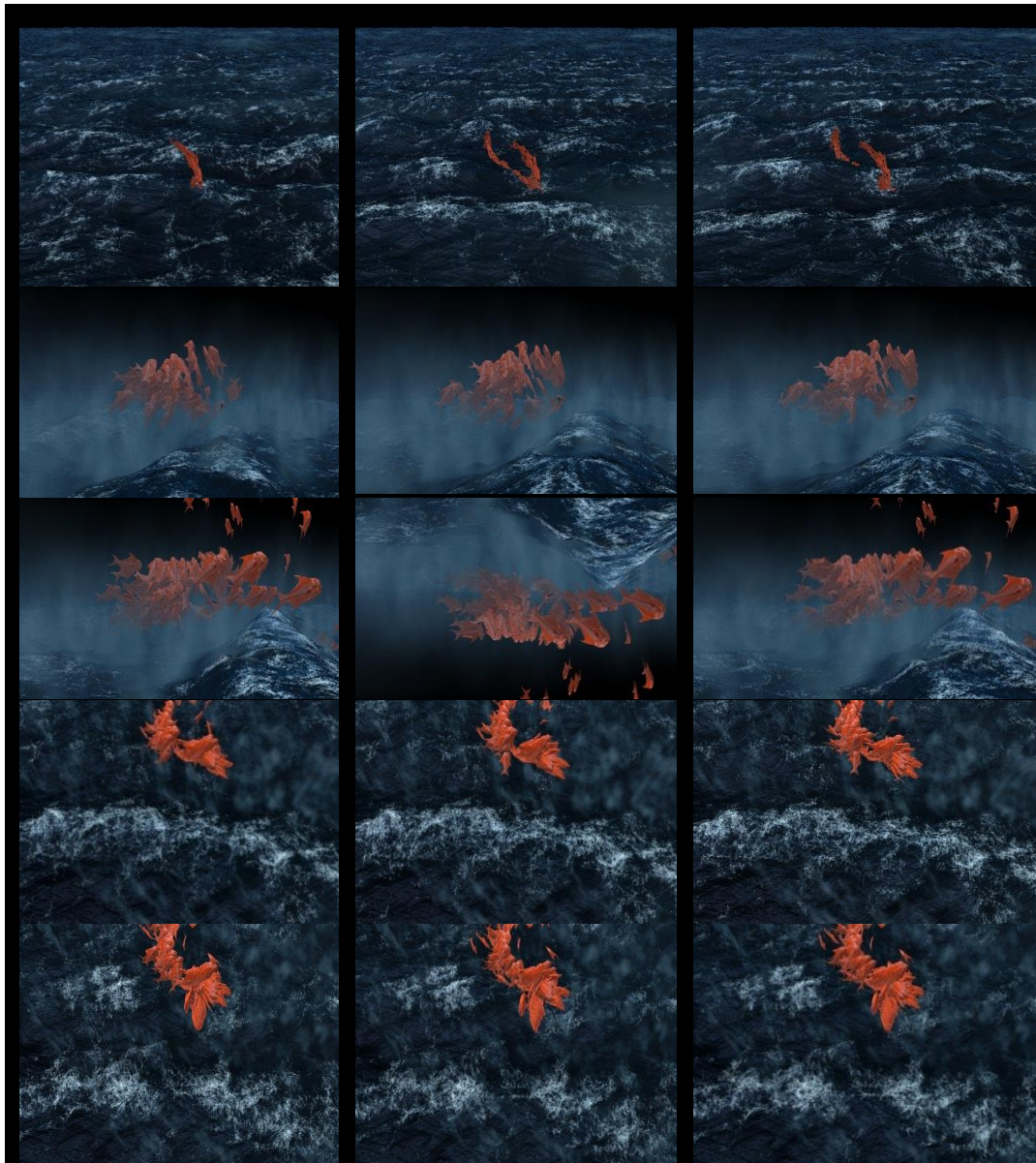


Figure 8: Particle instancer options parameters.

Now from particle menu we select instancer (Replacement). It will replace particles with our 3D fish model and it will create a group of animated fish that will follow the drawn path. Now we can see the animation by clicking on the play button.

## Simulation Results and Analysis

Simulation results are shown in the following figure 9. It's gives nice view of ocean scenario from different camera angles i.e., front view, perspective view and customized view. The wave of the sea is look like realistic and the lighting condition is good. Overall result is close to real environment. Thus it may save time, labor and money to shoot such scenes for the movie and television industry.



*Figure 9: Simulation results from different camera views.*

## **Conclusion**

We have shown the special function features of dynamic engine and the special features of visor package. Visor is a sophisticated package for preparing realistic three dimensional natural environment as well as various natural objects. It has an interface to easily choose pre animated object to create a desired three dimensional environment. Maya Dynamics gives real life animation of object which is difficult to simulate. Dynamics animation is based on the principal of physics. In our experimental results rendering yields satisfactory and nice

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animated images. The waves of the sea look like realistic ones and it produces turbulent environment. The swarm of fishes is seen to move in a harmonious way as in the case of real sea fishes. We can extend our work In the future by doing another nature oriented simulation by using Maya Dynamic engine like fire, smoke, dust, fog , rain etc. and with visor package we can expect to carry out research work to create other natural environments like trees and forest etc.

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