Environ: a visualization system aimed at massive CAD models

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1 INTRODUCTION

Environ (ENvironment for VIRtual Objects Navigation) is an application motivated by the demand to visualize large industrial engineering models coming from CAD tools [1][2][3]. Environ main goal is to offer 3D visualization resources with enough realism to be used for virtual prototyping, design review, change management systems, training, among other activities, being used from desktops to immersive VR projection facilities. In this video we are going to see massive models coming from Bentley MicroStation and highly textured models produced by Autodesk 3DStudio Max. Environ improves realism adding sky effects, dynamic oceans and real terrains in the virtual environment. It is also possible to incorporate some simulation resources.

2 TECHNIQUES

2.1 Culling

Using the Coherent Hierarchical Culling algorithm, we have verified a significant increase in rendering performance with CAD models (Figure 1). One major challenge is handling the issuing of queries while traversing the hierarchy and rendering geometries that are found visible.

2.2 Far Voxels

Environ uses an algorithm based on the Far Voxels technique to render massive models. This algorithm uses hierarchical levels of detail structures where intermediate (coarse) representations of submodels are represented by voxels.

3 VISUALIZATION RESOURCES

3.1 Risers

Oil platforms use ascending pipes, called risers, to bring the oil from the well in the sea floor to the oil platform’s separator tanks. Since risers are defined as a sequence of cylinders, shaders can be used to render the stream enabling users to get a close view of the pipe, without loosing resolution (Figure 2).

3.2 Computational Fluid Dynamics

Particles are used to show the flow movement, with additional information included in color. Using this kind of simulation, it is possible to analyze for example the smoke dispersion in case of accidents.

4 CONCLUSION

Environ has been designed to be an extensible tool, with flexibility to receive new functionalities and to incorporate plugins, according to the different necessities of the industry. This conception is the opposite of that of the available commercial solutions, normally offered as “black boxes”, with enhancements implemented by the developer on demand. We are trying to continuously enhance Environ with the advances in the field.

ACKNOWLEDGMENTS:

The models presented in the movie are courtesy of Petrobras.

REFERENCES