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PORTFOLIO

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3D visualization of sea

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Time-varying surfaces are present in many scientific applications. These surfaces are often generated and represented as polygonal meshes. A new technique for rendering sea as a polygonal mesh is presented. The sea surface is refined by means of a view-dependent tessellation algorithm and wave movements are simulated with Perlin noise.

In Fig. 1, we show a snapshot of the sea simulation we propose. Our method combines a tessellation technique with reflections and the Fresnel factor to offer more realism to the scene. The sea surface is modelled as a 3D polygonal mesh and it is completely refined on the graphics processor unit by applying a view-dependent tessellation algorithm. Wave movements are also simulated in this unit by using the Perlin noise method.

A sample tessellation guided by a simulated frustum is shown in Fig. 2. We have considered that a fictitious frustum (depicted in red) has been located on the mesh to guide the tessellation process, which also considers the distance to the camera. In this case, the initial mesh is composed of 256 triangles. In this example four tessellation steps are presented. These figures show how the tessellation process is capable of

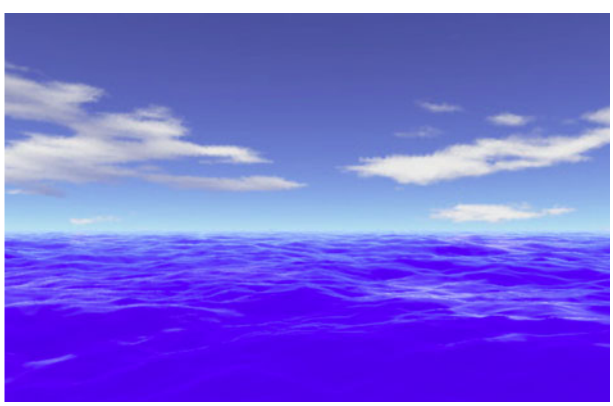

Fig. 1 3D simulation of sea integrated into a final application

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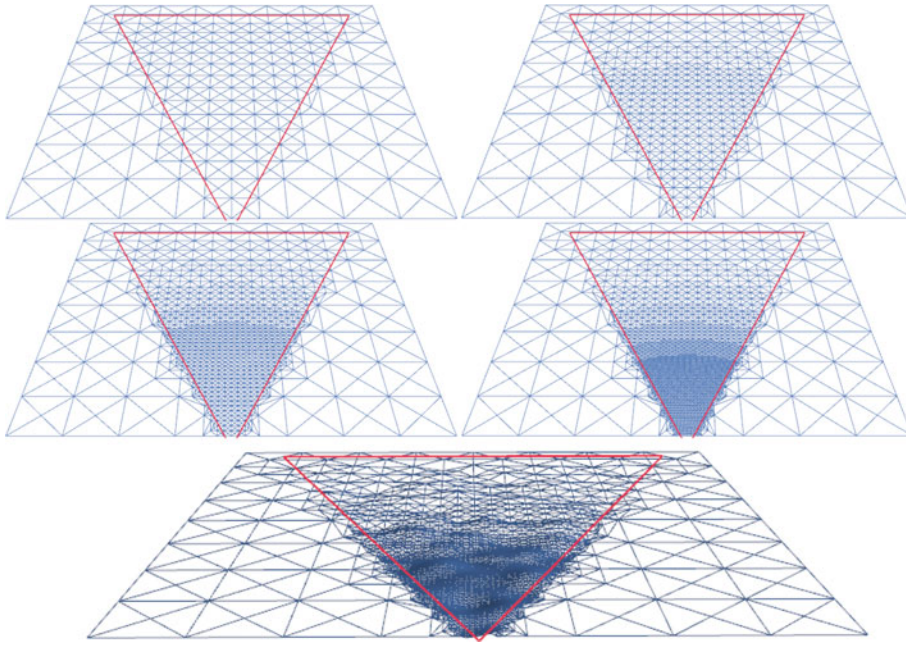

Fig. 2 Sample tessellation guided by a simulated frustum

increasing the detail of an input mesh without introducing cracks or other artifacts. Moreover, the last image of this figure presents the tessellated surface animated with Perlin noise, where only triangles within the frustum are animated.