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软件、算法与仿真

水下战视景仿真系统建模及实时场景渲染方法

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摘要：

针对水下对抗建模中随机误差加入的合理性及复杂环境实时细致再现的问题，提出了一种基于高层体系结构(high level architecture, HLA)和军用仿真平台Flames构建一个可定制、可重用的水下对抗视景系统的设计方法，引入基于分形布朗运动(fractional Brownian motion， fBm)特征约束的随机误差来构建仿真模型，同时开发出基于开放场景图(open scene graph， OSG)视景引擎的海面和水下空间，充分利用图形处理单元(graphic processing unit， GPU)实现海面和海底地形等的快速纹理映射及渲染。该系统能适应潜舰、直升机潜等多种水下对抗样式的视景仿真需求。实际应用结果表明，该系统具有较好的实时性和视觉效果。

关键词： 水下战 高层体系结构 开放场景图 图形处理单元 分形布朗运动

Modeling and real time scene rendering of underwater warfare visual simulation system

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Abstract:

According to the problems of random error's rationality in the modeling and the real time visualization of a complex environment, a novel approach based on high level architecture (HLA) and the military simulation platform "Flames" is presented for underwater counterwork visual systems, which is customizable and reusable. The random error of feature constraint is introduced to build a simulation model based on fractional Brownian motion (fBm). Besides, the ocean surface and underwater space are developed based on the engine of the open scene graph (OSG), which makes full use of the graphic processing unit (GPU) for achieving texture mapping and rendering rapidly of ocean surface, seabed terrain and so on. The system meets the demands of various underwater confrontations (e.g. submarine vs. naval ship, the helicopter vs. submarine, etc). The practical application results show that the system has good real time properties and visual effects.

Keywords: undersea warfare high level architecture (HLA) open scene graph (OSG) graphic processing unit (GPU) fractional Brownian motion (fBm)

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