



## 桥梁参数化建模系统的虚拟地形及数据组织

### Virtual Terrain and Data Organization in Parametric Modeling System of Bridge

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英文关键词: [virtual terrain](#) [quadtree](#) [fractal theory](#) [triangulated irregular network](#) [parametric 3D modeling](#)

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#### 中文摘要

结合桥梁参数化3D建模系统的需要,提出快速的虚拟地形生成算法。该算法利用分形理论丰富地形细节,通过四叉树存储不规则三角网,提高点在三角形的检索速度,使用稀疏控制点剖分检索到的三角形,实现桥梁模型和地形的合理叠加;通过点在三角形的查找实现视点与地形的快速碰撞检测,从而控制了视点范围;采用树状结构有效组织地形、天空球和桥梁模型等数据,最终生成以桥梁为主的逼真场景。最后对算法进行了测试,并将其应用在我们开发的桥梁设计软件中。

#### 英文摘要

According to the requirements of the parametric 3D modeling system of bridge, a new algorithm was developed to quickly generate a virtual terrain. The details of terrain were enriched by a fractal theory. In order to accelerate retrieval of the triangle containing the given point, a quadtree data structure was used to store triangulated irregular network. The triangle retrieved was subdivided by sparse control points to join bridge models and terrain. The viewpoint range was controlled by a quickly collision detection method between the viewpoint and the terrain. Sky sphere, terrain and bridge models were organized together based on the tree structure. Lastly, a lifelike scene of bridge was generated. The algorithm has been tested and applied in the bridge design software developed by us.

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