International Journal of Computational Science and Engineering
Volume 3, Issue 1, pages 71-79, 2007

Texture Mapping on 3D Surfaces Using Clustering-Based Cutting Paths

Lee, Tong-Yee; Yen, Shao-Wei

Abstract

Texture mapping is a common technique in computer graphics used to render realistic images. Our goal is to achieve distortion-free texture mapping on arbitrary 3D surfaces. To texture 3D models, we propose a scheme to flatten 3D surfaces into a 2D parametric domain. Our method does not require the 2D boundary of flattened surfaces to be stationary. The proposed method consists of three steps: (1) we find high distortion areas in a 2D parametric domain and find a cutting path over these areas, (2) we add virtual points to adaptively find the better parametric domain boundary instead of a predefined boundary and (3) we perform a well-known smoothing technique for better texture mapping. The proposed scheme can be efficiently realised by a linear system and yields interactive performance. Several experimental results for both genus-0 and non-genus-0 models are presented to verify the proposed scheme.

Key words：Clustering; Cutting paths; Parameterisation; Texture stretch; Virtual points; Texture mapping; 3D surfaces; Computer graphics; Distortion; Smoothing