

Error Bounded Variable Distance Offset Operator for Free Form Curves and Surfaces *

Gershon Elber[†] and Elaine Cohen
UUCS-91-001
Department of Computer Science
University of Utah
Salt Lake City, UT 84112 USA
Feb 1991

Abstract

Most offset approximation algorithms for freeform curves and surfaces may be classified into two main groups. The first approximates the curve using simple primitives such as piecewise arcs and lines and then calculates the (exact) offset operator to this approximation. The second offsets the control polygon/mesh and then attempts to estimate the error of the approximated offset over a region. Most of the current offset algorithms estimate the error using a finite set of samples taken from the region and therefore can not guarantee the offset approximation is within a given tolerance over the whole curve or surface.

This paper presents new methods to globally bound the error of the approximated offset of freeform curves and surfaces and then automatically derive new approximations with improved accuracy. These tools can also be used to develop a global error bound for a variable distance offset operation and to detect and trim out loops in the offset.