

CAGD Course Project

March 28, 2005

Project Title

Compute and plot Curvature of a given curve, Gaussian and Principal curvatures

Brief Description

The program code will take as input a knot vector and co-efficient matrix so as to plot the curve. It will then compute the acceleration vector given by:

$a(t) = \dot{u}(t)$ where $u(t) = \frac{c(t)}{\|c(t)\|}$. The acceleration vector $a(t)$ is \perp to $u(t)$. And the curvature for the curve is defined as:

$$k(t) = \frac{\|u'(t)\|}{\|c(t)\|}.$$

The program code will take as input 2 knot vectors and co-efficient matrices so as to plot the surface. It will then compute the co-efficients a_{20} , a_{02} , a_{11} of the function $f = a_{20}x^2 + a_{11}xy + a_{02}y^2$ required for making the desired matrix. The eigen-values for this matrix will then give us the Gaussian and the Principal curvatures i.e. if λ_1 and λ_2 are the eigen-values then $\lambda_1\lambda_2$ will give us the Gauss Curvature and $\lambda_1 + \lambda_2$ will give us the Principal Curvature.

Other Necessary Details

The code will be implemented in SciLab. It will take any user-defined surface as input given the proper knot vectors and co-efficient matrices.

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