Fairing an arc spline and designing with G2 PH quintic spiral transitions

Abstract

This paper describes a method to smooth an arc spline. Arc splines are G1 continuous segments made of circular arcs and straight lines. We have proposed a smooth version of arc spline by replacing its parts with C-, S-, and J-shaped spiral transitions, stitched with G2 continuity, by using a *single* segment of Pythagorean hodograph quintic function. Use of a *single* polynomial function rather than two has the benefit that designers have fewer entities to deal with. Spiral transitions are important in manufacturing industries because of their use in the cutting paths for numerically controlled cutting machinery, highway or railway designing, non-holonomic robot path planning and spur gear designing.