

An Alternative Method for Computing Clothoids

Authors : Gerardo Casal, Miguel E. Vázquez-Méndez

Abstract : The clothoid (also known as Cornu spiral or Euler spiral) is a curve that is characterized because its curvature is proportional to its length. This property makes that it would be widely used as transition curve for designing the layout of roads and railway tracks. In this work, from the geometrical property characterizing the clothoid, its parametric equations are obtained and two algorithms to compute it are compared. The first (classical), is widely used in Surveying Schools and it is based on the use of explicit formulas obtained from Taylor expansions of sine and cosine functions. The second one (alternative) is a very simple algorithm, based on the numerical solution of the initial value problems giving the clothoid parameterization. Both methods are compared in some typical surveying problems. The alternative method does not use complex formulas and so it is conceptually very simple and easy to apply. It gives good results, even if the classical method goes wrong (if the quotient between length and radius of curvature is high), needs no subsequent translations nor rotations and, consequently, it seems an efficient tool for designing the layout of roads and railway tracks.

Keywords : transition curves, railroad and highway engineering, Runge-Kutta methods

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