Differential geometry using Mathematica

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Abstract

This is a brief overview of elementary notions in Differential geometry of curves and surfaces. We define smooth parameterized curve and discuss its length, arc length parametrization and curvature. We show that the planar curve is up to isometry determined by its curvature function. We also discuss spatial curves, their torsion and associated moving frame. In the surface theory the notion of parametrization, normal vector and orientability are discussed. We give many examples of well known parameterized surfaces. Software Mathematica is used for symbolic calculations and visualization. We also explain how to use software Javaview to display graphics and animations on the Internet.