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Titolo:

The interaction of curves and surfaces

Abstract:

The first edition of Alfred Gray's book "The Modern Differential Geometry of Curves and Surfaces with Mathematica" was already designed to exploit the unique characteristics of Mathematica's programming and plotting capabilities. Since then, the software has evolved almost beyond recognition, and it will be the purpose of this talk to describe some of the powerful features in the latest versions of Mathematica that the speaker has encountered in advance of a planned update of the third edition of the book (which was edited by E. Abbena and S. Salamon, and published by Taylor and Francis in 2006).

The presentation will focus on the interaction between curves and surfaces in space. Examples will be chosen from the following: the plotting of geodesics, curves associated to rotations and Lie groups, colouring surfaces by geometrically-significant functions, projections of simple curves and surfaces from 4 dimensions to 3, and the implicit plotting and animation of families of algebraic surfaces. The aim will be to show how Mathematica can lead not just to a fresh understanding of traditional topics, but also to new research in differential geometry.