

Introducing parametric curves with CAS

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The TI-Nspire CX CAS handheld device is mandatory in every math courses at École de technologie supérieure. Our engineering students learn single-variable calculus in a one-term course (MAT145). Students get their motivation to learn mathematical concepts through applied problems. Hence, in-house course notes [1] were written to emphasize on the applications of the syllabus material and the use of CAS.

The multi-variable calculus course (MAT165) follows a classic reference textbook [2] contrary to the more hands-on approach pursued in MAT145. Many concepts can be explored and visualized with graphs of level surfaces. Plotting 3D objects is a useful feature of TI-Nspire, but it requires the use of parametric curves and surfaces. Vector functions are a fundamental tool for the course, but students hardly conciliate the graphical representations of these functions with their algebraic definition. Moreover, the students are challenged by the general and abstract setting in which these mathematical concepts are introduced.

The aim of this talk is to explore alternative ways for introducing the concept of parametric curves and vector functions using computer algebra. More focus will be given to different vector calculus concepts presented in applied problems. Software such as TI-Nspire will be used to graph and manipulate parametric curves.

Keywords: Parametric curves, Vector functions, Applications

References

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- [2] J. STEWART, *Concepts et contextes, Fonctions de plusieurs variables*, De Boeck, 2011

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