

Programming With CAS: An Example of Use in Line Integrals for Engineering

José L. Galán-García, Gabriel Aguilera-Venegas, Pedro Rodríguez-Cielos, Yolanda Padilla-Domínguez, María Á. Galán-García, Gema M. Lobillo-Mora
University of Málaga
jlgalan@uma.es, gabri@ctima.uma.es, prodriguez@uma.es,
ypadilla@ctima.uma.es, magalan@ctima.uma.es, gmlobillo@uma.es

Ricardo Rodríguez
Universidad Politécnica de Madrid
ricardo.rodriguez@upm.es

Abstract

CAS (Computer Algebra Systems) are widely used in the teaching of Math subjects in Engineering. In this talk we will focus on their use in programming in order to help in the teaching and learning process in Engineering. Specifically, we will use programming with CAS in the topic *Line Integrals* and its applications. We will deal with programs that provide the result step by step. This way, students can use these programs as a tutorial and increase their self-learning process. We will explain how the students develop such programs and how this development improve their knowledge on Line Integrals. When students program they become the protagonists of their own learning process.

The main topic that we will deal with are, parametrization of paths, line integrals computation (both, using definition and through the potential function, if it exists) and different applications of line integrals (computing path lengths or multiple applications in Physics such as computing the work by a particle moving from a point to another following an specific path, or the mechanical behavior of a wire rope).

References

1. G. AGUILERA AND J.L. GALÁN AND M.Á. GALÁN AND A. GÁLVEZ AND A.J. JIMÉNEZ AND Y. PADILLA AND P. RODRÍGUEZ. Teaching Line Integrals and their applications Using DERIVE 6 as a PECAS. Computer Algebra in Education (2008) 81-108. Ed: AulonnaPress. ISBN 978-0-9754541-9-6.
2. Y. PADILLA. Integrales de Línea con DERIVE. Un estudio de innovación curricular en primer curso de Ingeniería Técnica de Telecomunicación. PhD Thesis (2003). ISBN 84-688-8420-0.