

FIABRAICO: A Computer Algebra based software for System Reliability computations
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The use of commutative algebra for the evaluation of system reliability started in a paper by Giglio and Wynn [1]. This line of research was extended in a series of papers by Sáenz-de-Cabezón and Wynn [2,3,4] in which they apply the theory to widely used particular systems and develop the necessary algorithms to make this theory applicable to actual systems in industry and science. The results in these papers show that the algebraic method is both general and efficient, in the sense that it can be applied to a wide variety of systems with mild assumptions and it is also a competitive alternative to other algorithms in the reliability literature.

A step forward towards the inclusion of this algebraic theory in the toolbox of system reliability engineers is the implementation of the algorithms and the development of software usable without expertise in commutative algebra. In the present talk we introduce a prototype software called FIABRAICO which consists on a computation engine written in C++ using the C++ algebraic library CoCoALib [5] and a java interface. While the java interface deals only with systems, reliabilities and graphics, all the algebraic computations are run in the background by an efficient implementation of the algorithms that compute monomial ideals, Hilbert series and Betti numbers, on which the theory is based.

References:

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