English summaries

Miriam Alcalá Vicente

The beginning of non-Euclidean geometry in Italy

Non-Euclidean geometry is probably one of the most revolutionary theories of the 19th century. After remaining unnoticed for over 30 years, from 1860 it underwent a Renaissance process, which was driven by the work of two mathematicians: Jules Hoüel and Giuseppe Battaglini.

This article is about the process of dissemination, development and acceptance of the new geometry, focusing on the Italian context. In particular, we will show that the contribution of G. Battaglini to this area goes far beyond the disclosure. At the end of his article «Sulla geometria immaginaria di Lobatschewsky», we find an unexpected coincidence between his description of the non-Euclidian plane and the subsequent Beltrami's disk model. Our purpose is to justify the similarities between these two interpretations.

Keywords: history of geometry, non-Euclidean geometry, Hoüel, Battaglini, Beltrami.

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The method of lines for numerical solutions of partial differential equations

In this paper, we describe a semi-discrete method for a numerical resolution of a type of partial differential equations called the method of lines (MOL). This method is based on the discretization of all but one of the variables of the problem. We illustrate this method by solving the Laplace equation in Cartesian

coordinates. We compare the concepts used by the MOL with respect to the analytical method of variable separation. We show that the results obtained with the MOL are very good approximations of the analytical solutions.

Mercè Villanueva and Cristina Fernández-Córdoba

Error detecting and correcting codes and some of their applications in the information society

In digital transmissions of information from a sender to a receiver through a channel, errors may occur. In this article, the most important concepts and results of the theory of error detecting and correcting codes are discussed. This theory studies efficient methods to guarantee accurate transmission of information. First, some everyday examples of error detecting codes are described, such as the codes included in DNI, ISBN, IBAN and EAN. Next, the classical theory of error correcting codes is presented, particularly considering linear codes and, within them, cyclic codes, which are more efficient for encoding. The two most important families of cyclic codes, the BCH and Reed-Solomon codes, which also make it possible to decode efficiently, are also described. Lastly, two historical applications, in computer memories and the transmission of photographs in space, and two more recent applications, in QR codes and distributed storage, are shown.