A CONSTRUCTIVE APPROACH TO THE INFINITESIMAL ANALYSIS: EPISTEMOLOGIC POTENTIALS AND LIMITS OF THE "TRACTIONAL MOTION"

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Abstract

The recent foundational approaches to infinitesimal analysis (both the classical foundation or the Robinson non-standard analysis, the finitistic approach of the Kronecher and Brouwer intuitionism or the Turing and Weihrauch computational analysis) have in common the fact that they are essentially algebraic or computational, while historically one of the first approach to these problems was geometrical. In this perspective we have to cite the born and the development, up to the 17th century, of the "inverse tangent problem", whose solution introduced certain machines that, intended as both theoretical and concrete instruments, were justifying the existence of certain solutions or curves extending the Cartesian algebraic machines model, generating the so called "tractional motion".

The main idea of this work is to deepen and extend the tractional motion to investigate if and how, at a first analysis, these *ideal* machines (like the ancient straightedge and compass) can constitute the basis of a purely geometrical and finitistic axiomatic foundation (like the Euclidean geometry) to set and solve a class of differential problems. In particular it will follow a model of the machines (i.e. the suggested components), some preliminary results (both about generable functions and didactical suggestions) and, as an example, there will be a sketch of a "tractional" planar machine embodying the complex exponential function.