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Analysis and the Emergence of Analytic Mechanics in the Eighteenth Century

By the middle of the eighteenth century the term analysis had largely lost its original meaning of “solution backwards”. As is well known, during the early modern period analysis came to denote algebra and the use more generally of symbolic methods in the solution of problems. When one introduces a variable and derives an equation, one is assuming logically at the outset that the thing that is sought is at hand, even if one does know its value. Hence all methods in which the existence of the thing sought is first assumed as an unknown variable and its value is derived by means of some mathematical process is analytic. Analysis came to encompass algebraic symbolic methods that yielded equations and was contrasted with geometric modes of solution. It was seen not simply as a method but as a subject area in its own right employing processes that were linguistic or symbolic in character. Above all, analysis avoided geometric modes of representation. Synthesis denoted a geometrical conception of the mathematical object in which this object has a whole was taken as given and in which its known properties were used in the course of the investigation.

The elevation of analysis within mathematics was paralleled by the promotion of what was called the method of analysis in other areas of inquiry. In the writings of Isaac Barrow (1630–1677), Etienne Condillac (1714–1780) and Thomas Reid (1710–1796) analysis, understood as a very general process of investigation, was put forward as the way to truth in all branches of inquiry. The paper explores the meaning of analysis in eighteenth-century exact science for the case of analytical mechanics and considers mathematical analysis in reference to the larger intellectual context of Enlightenment thought.