Discovery of Lagrange multipliers and Lagrange mechanics

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The talk explains how

- A work of Archimedes (-287 to -212, 2300 anni fa),
- A thick book on statics (Varignon 1725),
- a letter by Johann Bernoulli to Varignon (1715, 300 anni fa),
- Euler’s Methodus (1744, on variational calculus),
- and d’Alembert’s Dynamique from 1743,

led to the famous Mécanique analytique (1788, 1811) by Lagrange, in which, in the first part, the advantage of the methods of multipliers is demonstrated at many examples and, in the second part, the equations of Lagrange dynamics are derived from the principle of least action.

In the last part of the talk we show the connection of the ideas of Euler and Lagrange with problems of optimal control (Carathéodory, Pontryagin).