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Building a new discipline with old tools: Astronomical techniques in 16th-century theoretical navigation

BY MID SIXTEENTH CENTURY several Iberian authors proposed a scientific approach to problems of navigation and laid the mathematical basis for the new discipline of theoretical navigation. The most famous among them was the Portuguese Pedro Nunes (1502–1578) who, in works published between the 1530s and 1560s, systematically set forth the concepts and the techniques of theoretical navigation. As the title of his main work hints (*De regulis et instrumentis ad varias rerum tam maritimarum quam coelestium apparentias deprehendendas ex mathematicis disciplinis*) setting the theoretical foundations of this new discipline required a thorough analysis of astronomical notions and mathematical techniques of contemporary astronomy.

Although the story of how the instruments of astronomy came to be used in navigation in the 15th and 16th centuries has been told in many places, much less is known about the transfer of knowledge in what concerns mathematical techniques, i.e. how mathematical procedures used in astronomy were applied to navigation problems. In this presentation I will address this topic. I will focus in particular on the case of the development of the loxodromic curve — a geometrical curve far more complex than any other known at the time — showing that its introduction required ingenious approaches to problems of spherical trigonometry that pushed the tradition of Menelaus, Theodose and Ptolemy to its limits.

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