MATHEMATICS IN THE BAROQUE PERIOD IN SPAIN

Dr. Luis Rico and Dr. José Luis Lupiáñez
University of Granada, Spain

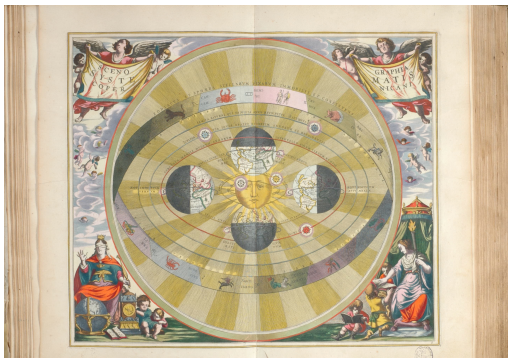
Baroque Mathematics: from Viète's death (1603) to Euler's birth (1707)

The 17th century Spain is very advanced culturally and, in certain respects, very refined. Although Spanish culture in the reached an unprecedented peak, mathematics activity in Spain entered a period of decline and did not share in the burst of mathematics knowledge occurring in other European countries during this century. **Cervantes** and **Velázquez** are unique examples of high level Spanish culture of the time. Both exemplify the dissemination of the culture of mathematics in Spain during their lives.


EL INGENIOSO HIDALGO DON QVIXOTE DE LA MANCHA
Compuesto por Miguel de Cervantes Saauedra.
DIRIGIDO AL DVQVE DE BEIAR, Marques de Gibraleon, Conde de Barcelona, y Banares, Vizconde de la Puebla de Alcozer, Señor de las villas de Capilla, Curiel, y Burguillos.
Ano, 1605.
Con priuilegio de Castilla, Aragon, y Portugal.
EN MADRID. Por Iuan de la Cuesta.

In executing his work, Velázquez shows mastery of highly advanced knowledge of geometry in his treatment of geometric forms

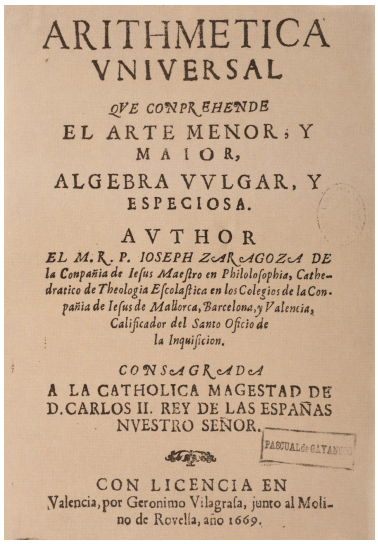
In *Don Quixote*, Cervantes revealing his knowledge about mathematics: *"... they must bring tangible, easy, intelligible, demonstrable, unquestionable examples, with mathematical proof that cannot be denied, as when they say: 'If we take equal parts from two equal parts, the parts left are also equal'* (Part I, Chapter 33).



The work of Spanish mathematicians in this century was removed from contemporary advances in Europe, possibly due to the policy of intellectual isolation imposed at the end of the reign of **Philip II** (continued by his successors), and to the control of Catholic hierarchy. Spain does maintain traits of genuine mathematical knowledge, however, it is expressed with the greater freedom in Hispanoamerica.

On the peninsula, the mixing of science and religion prevents acceptance of the advances of the scientific revolution, the Copernican model of the universe, Kepler's laws, and the advances of analytic geometry and algebra that occur during this century. The Copernican system was excluded from the orthodox scientific model for ideological reasons.

Scientific activity in Hispanoamerica enjoyed more degrees of freedom although the less political power of the church and a lower level of intellectual activity. The sun's declinations were calculated in "De Revolutionibus" (Dominican Republic). In 1663, **Lázaro Flórez** used the work of Copernicus and Tycho Brahe to adapt the calculation tables to the Havana Meridian.


ARITHMETICA VNIVERSAL
QVE CONPREHENDE EL ARTE MENOR; Y MAIOR, ALGEBRA VVLGAR, Y ESPECIOSA.
AVTHOR EL M.R.P. IOSEPH ZARAGOZA DE la Compañia de Iesus Maestro en Philosophia, Catheddratico de Theologia Escolastica en los Colegios de la Compañia de Iesus de Mallorca, Barcelona, y Valencia, Calificador del Santo Oficio de la Inquisicion.
CONSAGRADA A LA CATHOLICA MAGESTAD DE D. CARLOS II. REY DE LAS ESPAÑAS NVESTRO SEÑOR.
CON LICENCIA EN Valencia, por Geronimo Vilagrasa, junto al Molino de Rovella, año 1669.

José Zaragoza was the main Spanish astronomer of this century. He was very knowledgeable of the latest foreign bibliography. As a mathematician, Zaragoza made several notable contributions. He introduced the concept of a geometric point with the properties of the physical center of gravity for a system of weighted parts. He demonstrated all of these properties with Euclidian rigor and applied this knowledge to solving problems involving the calculation of ratios among geometric magnitudes. Zaragoza anticipated *Barycentric Calculus* by over a century.

The *Universal Arithmetic that includes the greater and lesser art,Common and Specious Algebra*, published in Valencia in 1670, introduces Spain for the first time to Viète's algorithm for calculating the roots of polynomial equations.

Antonio Hugo de Omerique was one of the most important Spanish mathematicians of the 17th century. He published his geometric *Analysis* in 1698, a work praised by Newton and that anticipates some results of the analyses published later, although the work had hardly any influence on the mathematicians of his time.