Proposal id: 110

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**Infinite sums and the calculation of π, as presented by the Swedish mathematician Anders Gabriel Duhre in the early 18th century**

**Abstract**

The Swedish mathematician and mathematics teacher Anders Gabriel Duhre (1680–1739, or possibly 1681–1739) was an important and influential person in the Swedish mathematical society in the early 18th century. He had studied mathematics at Uppsala University, Sweden, and had taught mathematics for a few years to engineering students and prospective officers, before he in 1723 opened his own school, Laboratorium Mathematico-Oeconomicum, outside Uppsala, where theoretical and practical subjects were taught to young boys. Of particular interest is that mathematics was taught in this school; Duhre had knowledge of mathematics that was not yet taught at the university, and students at the university turned to him to learn more on modern mathematics. Among his students were several of the Swedish mathematicians to be established during the 1720s and 1730s. Duhre taught in Swedish and early on planned to write mathematical textbooks in Swedish in order to introduce the Swedish youth to new and modern mathematics.

Duhre contributed with two textbooks in mathematics – one in algebra and one in geometry. Both were based on his lecture notes. The first book, *En Grundelig Inledning til Mathesin Universalem och Algebram* ("A thorough introduction to universal mathematics and algebra"), was edited by Georg Brandt and published in 1718. In this book, modern algebra based on Descartes' notation is presented, as well as examples from Newton's, Wallis' and Nieuwentijt's theories from the end of the 17th century. For example, he treats infinitesimals and utilizes Wallis' method of induction to determine the quotient of infinite sums. In his second book, *Första Delen af en Grundad Geometria* ("The first part of a founded geometry") published in 1721, Duhre takes advantage of the theories he presented earlier in his book on algebra. Of particular interest is his use of algebra in the geometrical context. In this paper, we will consider his utilization of infinitely small quantities and infinite sums to determine the quotient between the circumference and the diameter of a circle, in order to find an expression for π. However, it is not the circumference but rather the area of the circle he considers, which he can determine after first developing a general method for determining the area under a curve. In his search for π, Duhre uses modern algebra that cannot be found in Wallis'*Arithmetica Infinitorum*.

Duhre considers algebra to be helpful, since it enables complicated expressions to be transformed into simpler ones, and thus convenience in calculations is obtained. He also points out that through utilizing algebra, geometric results can be generalized, since the unknown does not necessarily have to refer to geometrical objects, but could as well be another kind of quantity.While Duhre primarily was an educator, his main pioneering achievement was that he brought knowledge of modern mathematics into the Swedish mathematical community.

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