



The BIG SIGMAA News

VOLUME 15, NUMBER 2

FALL 2019

**Business, Industry, and Government Special Interest Group
of the Mathematical Association of America**

BIG Events at JMM in Denver

Special points of interest:

- *The Joint Mathematics Meetings will be held January 15-18 in Denver.*
- *The BIG Contributed Paper Session will be held on Thursday morning, January 16, beginning at 8:00.*
- *The BIG SIGMAA business meeting will be held on Friday, January 17, at 4:30, with the reception following at 5:15.*

In January, the Joint Mathematics Meetings (the joint annual meeting of the American Mathematical Society and the Mathematical Association of America) returns to Denver after a long absence. (The meetings were last held in Denver in 1983). In addition to the sessions sponsored by the AMS and the MAA, there will also be some sessions sponsored by the Association for Women in Mathematics, the National Association of Mathematicians, the Society of Industrial and Applied Mathematicians, and the Association for Symbolic Logic. JMM claims to be the largest meeting of mathematicians in the world; over 5,900 mathematicians attended the meetings last January in Baltimore. The

Different Problems, Common Threads: Computing the difficulty of Mathematical Problems, Karen Lange (Wellesley College)

Mathematical Frameworks for Signal and Image Analysis (Colloquium Lectures), Ingrid Daubechies (Duke University)

In Praise of Small Data: Statistical and Data Science (Josiah Willard Gibbs Lecture), Nancy Reid (University of Toronto)

The Mathematics of Life: Making Diffusion Your Friend (SIAM Invited Address), James Keener (University of Utah)

Biomedical Data Sharing and Analysis at Scale, Bonnie Berger (Massachusetts Institute of Technology)

A Numerical and Analytical Study of Dynamic Materials, Suzanne Weekes (Worcester Polytechnic Institute)

2020 meetings will be held January 15–18. As always, there is an exciting lineup of invited speakers and, of course, there are lots of inter-

esting sessions of shorter talks. Several of the invited talks might be of particular interest to BIG SIGMAA

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New Officers in the BIG SIGMAA

The results are in, and the BIG SIGMAA has elected three new officers who will begin two-year terms at the conclusion of the Joint Meetings in January.

The new Chair of the BIG SIGMAA is **Caroline Maher-Boulis**. Dr. Maher-Boulis is a professor of mathematics at

Lee University in Cleveland, TN. Maher-Boulis received her master's and Ph.D. in pure mathematics, with a minor in financial mathematics, from Florida State University. She is currently BIG SIGMAA's Secretary/Treasurer. Caroline's interests include raising awareness among

mathematics majors of non-academic careers. During her tenure at Lee University she developed a bachelor's degree with emphasis on actuarial sciences, created a mathematics internship program, secured formal partnerships with local businesses and in-

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Michel Rolle (1652–1719)

November 8, 2019 marks the three hundredth anniversary of the death of the French mathematician Michel Rolle, for whom Rolle's Theorem is named.

Rolle was born on April 21, 1652, in Ambert, in central France. The son of a shopkeeper, Rolle received only an elementary education. He worked for a time in Ambert as a transcriber for a notary and then as an assistant to several attorneys. In 1675 he moved to Paris. A short time later he married, and children quickly followed. He struggled to support his family on his meager wages. Despite his financial problems and minimal education, though, he studied algebra and Diophantine analysis on his own.

Rolle's fortune changed dramatically in 1682 when he published an elegant solution of a difficult, unsolved problem in Diophantine analysis that had been posed by Jacques Ozanam; the problem was the following:

Find four numbers, the difference of any two being a perfect square and the sum of the first three being a perfect square.

Ozanam had stated that the smallest of the four numbers would have at least 50 digits, but Rolle found four numbers satisfying the conditions with

each number having seven digits. The public recognition of his achievement led Jean-Baptiste Colbert, the controller general of finance and secretary of state for the navy under King Louis XIV, to reward Rolle with a pension, and it led François Michel le Tellier, Marquis de Louvois, the secretary of state for war, to employ Rolle to tutor his son in mathematics. Louvois also arranged for Rolle to have an administrative position in the Ministry of War, but Rolle disliked the work and soon resigned.

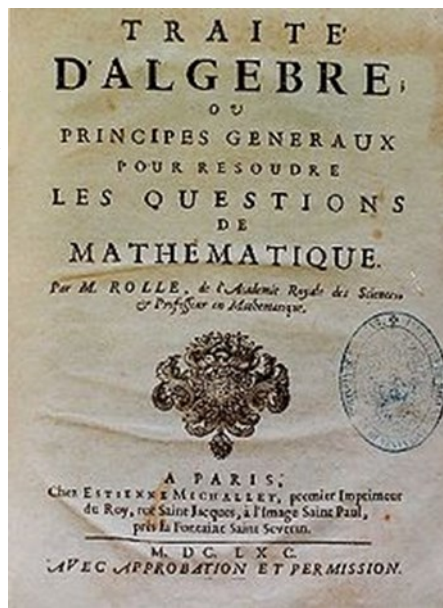
In 1685 Rolle was elected to the Académie des Sciences, but to a very low-level position; he received no regular salary until 1699, when he was promoted to a salaried position. This was a distinguished post because of the 70 members of the Academy, only 20 were paid. He remained at the Académie for the rest of his life.

Rolle was one of the most vocal early critics of calculus,

which is ironic, since Rolle's theorem is essential for basic proofs in calculus. He strove intently to demonstrate that calculus gave erroneous results and was based on unsound reasoning. He quarreled so vehemently on the subject that the Académie des Sciences was forced to intervene on several occasions. He eventually, however, conceded that he was wrong.

While Rolle's forte was always Diophantine analysis, his most important work was a book on the algebra of equations, called *Traité d'algèbre*, published in 1690. That book contains the

first published description in Europe of the Gaussian elimination algorithm, which Rolle called the method of substitution. Some examples of the method had previously appeared in algebra books, and Isaac Newton had previously described the method in his lecture notes, but Newton's notes were not published



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The Puzzle Corner

While walking down the street in an unfamiliar but friendly city with your host, you meet three men walking in the opposite direction--Abe, Bob, and Cal. Your host tells you that one is a farmer, one is a salesman, and one is a debt collector. It being a friendly city, you stop to chat with the three men, asking them about their jobs. They respond as follows:

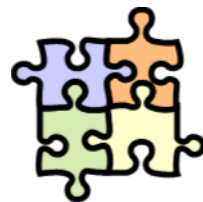
Abe: Cal is a salesman but Bob is not a debt collector.

Bob: Abe is a farmer but Cal is not a debt collector.

Cal: Abe is a debt collector but Bob is not a salesman.

Your host then remarks that only one of your new friends has told you the truth.

What is each man's job? (solution on page 4)



BIG Events at JMM in Denver (continued)

(Continued from page 1)

members; see the inset. You can find the details at the JMM website.

The BIG contributed paper session will be held on Thursday morning, beginning at 8:00. Four speakers, from industry, government, and academia, will talk about their experiences in applying mathematics to BIG problems.

The BIG SIGMAA business meeting will be held on Friday afternoon at

4:15, followed by a reception. All BIG SIGMAA members are invited to attend the business meeting and the reception. The reception will provide an opportunity to meet old friends and to network with other BIG mathematicians.

Other BIG events at the meeting include the following activities. For more information on these, go to the JMM website.

- A panel discussion on Wednesday afternoon on data science post-

secondary education

- A panel discussion on Friday afternoon on actuarial science education
- The BIG Career Center in the exhibits hall, a booth designed to provide BIG employers and BIG job seekers a centrally-located venue to network.

We hope to see many of you in Denver.

New Officers in the BIG SIGMAA (continued)

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dustries and supervised BIG projects with students. She is an experienced grant manager having secured several grants from the Tennessee Higher Education Commission, local businesses and industries and a 5-year grant from NSF in which she collaborates with ten other institutions. Her vision for BIG SIGMAA includes creating more networking opportunities and collaborating with MAA sections to include BIG SIGMAA activities in their annual meetings.

The new Vice Chair for Programs is **Vinodh Chellamuthu**. Dr. Chellamuthu is an Assistant Professor of Mathematics at Dixie State University (DSU), St. George, Utah. He received his Master of Science Degree in Applied Mathematics from Tulane University and his Ph.D. Degree in Applied and Computational Mathematics from the University of Louisiana at Lafayette. He had multiple opportunities to work on projects from government agencies during his experience as a Project Associate and Graduate Research Assistant. For instance, he worked on an NWRC-USGS spon-

sored project dealing with modeling effective control strategies to mitigate the influence of frog skin diseases in the ecosystem. He also had an opportunity to work for projects sponsored by the Indian Space Research Organization, where he used data mining techniques to analyze remote sensing images. During his tenure at DSU, he has mentored several students on their research projects coming directly from Business, Industry, and Government Agencies through the MAA PICMath program. At DSU, as a curriculum developer and program coordinator of the B.S. Applied and Computational Mathematics degree, he has coordinated and collaborated with multiple stakeholders including businesses and industries from the local community. He is firmly committed to promoting the quality education of future scientists and a strong network of BIG professionals through BIG SIGMAA.

Finally, the new Secretary/Treasurer is **Aaron B. Luttman**. Dr. Luttman is an Advisor at Pacific Northwest National Laboratory (PNNL), Richland, Washington, where his work focuses on the science of nuclear security. He received degrees in mathematics from

Purdue University, the University of Minnesota, and the University of Montana, after which he was an assistant professor at Bethany Lutheran College in Mankato, MN, and at Clarkson University in Potsdam, NY, where he won the university-wide Outstanding New Teacher award in 2010. Dr. Luttman then spent 7 years at the U.S. Department of Energy's Nevada National Security Site as a scientist, personnel manager, and scientific advisor to the National Nuclear Security Administration, before moving to PNNL in spring 2019. He has served on the MAA Committee for Graduate Students, was a 2007 Project NExT Fellow (Sun Dot), and gave an MAA Carriage House Distinguished Lecture on student research in national nuclear security. As a government scientist, he has also been active in the MAA's PICMath program and the BIG SIGMAA.

If you are attending JMM, please come to the BIG SIGMAA business meeting and reception Friday afternoon to meet and congratulate the new officers.



A Limerick

A mathematician I know
Tried to count up to pi in one go.
But he soon got confused
When he found that he'd used
His yearly supply of Cointreau.

Michel Rolle (continued)

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until 1707. Rolle's statement of the method seems not to have been noticed, however, in so far as the lesson for Gaussian elimination that was taught in 18th and 19th century algebra textbooks owes more to Newton than to Rolle.

Also, in the book Rolle proved a polynomial version of the theorem that today bears his name. Given his ani-

mosity to infinitesimals, it is fitting that the result was couched in terms of algebra rather than analysis. Only in the 18th century was the theorem interpreted as a fundamental result in differential calculus. Indeed, it is needed to prove both the mean value theorem and the existence of Taylor series. As the importance of the theorem grew, so did the interest in identifying its origin; it was finally named Rolle's theorem in 1846 by Giusto Bellavitis.

Among his several achievements, Rolle invented the notation for the n th root of x and helped to advance the currently accepted size order for negative numbers. Descartes, for example, viewed -2 as smaller than -5 . Rolle preceded most of his contemporaries by adopting the current convention in 1691.

In 1719 Rolle suffered a stroke and died in Paris. No contemporary portrait of him is known.

A Winter Fib

In
the
Vermont
winter cold,
Wilson Bentley found
a way to photograph snowflakes.
He made over five thousand images of snowflakes,
all with a perfect, delicate, crystal-clear six-fold symmetry and no two alike.

Puzzle Corner Solution

Assume Abe is telling the truth. Then Cal is a salesman and Bob is not a debt collector. Since Bob is not a salesman either (since Cal is the salesman), it follows that Bob is the farmer, and therefore Abe is the debt collector. Thus

Abe: debt collector
Bob: farmer
Cal: salesman

But then Cal also told the truth. Thus Abe did not tell the truth.

Assume Cal told the truth. Then, by a similar argument,

Abe: debt collector
Bob: farmer
Cal: salesman

But then Abe also told the truth. Thus Cal did not tell the truth.

Thus Bob told the truth. So Abe is the farmer and Cal is not a debt collector. Hence Cal is the salesman and Bob is the debt collector: