

Newsletter

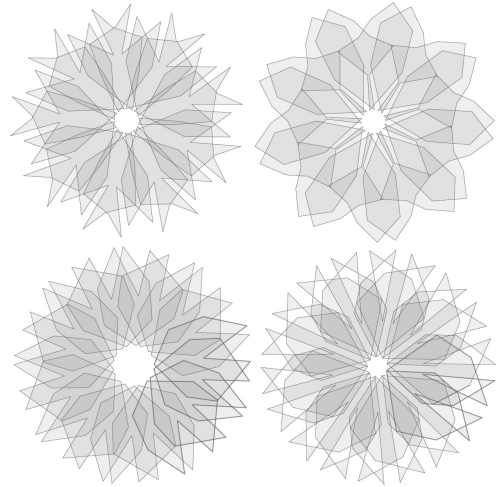
BELGIAN MATHEMATICAL
SOCIETY

116, January 15, 2018

Comité National de Mathématique CNM

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N

NCW Nationaal Comité voor Wiskunde



**Newsletter of the Belgian Mathematical Society
and the National Committee for Mathematics**

ULB Campus Plaine, C.P. 218/01,
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Happy 2018

Let me start by wishing all readers of the Newsletter a very happy and interesting year 2018.

For the Belgian Mathematical Society a highlight of this year will be a new edition of the PhD-Day. This will be held on Friday May 25th, 2018 in Gent. The aim is to bring together the Belgian Mathematicians

preparing their PhD or having obtained their PhD diploma during the academic year 2017–2018. Last PhD-Day was in 2013 and we think it is time to give the floor to the new generation of PhD students to show us and their fellow PhD students what they are working on. May I ask all of you to save that date in your diaries and to encourage your PhD students to participate? More details will be announced on the website and in the next Newsletter.

Further in this Newsletter you will find announcements for activities in and out of Belgium. We are glad to include an announcement from the VVWL (the Flemish Maths Teachers' Association), showing the good relations we have with the teachers' associations with whom we organised a successful conference last year. At the end of the Newsletter you will also find reviews of two novels describing the interesting world of computations at NASA in the early days of space conquest (1940–1970). In those days computers were quite limited and lots of work still had to be done by hand. I want to thank Adhemar Bultheel for sharing his very detailed reviews of books connected to mathematics or mathematicians.

At the beginning of the year it is also my duty to remind you that our Society still needs your support. One way of supporting us is of course to pay your membership dues. The price for an ordinary membership is still the same: 20€ per year. You will find all details concerning the payment of your dues, reciprocity membership, EMS membership, ... in Section 1.1. Another way of supporting us is of course to provide us with information and announcements for our website and Newsletter. We still have the impression that there is a lot more happening in the Maths departments than what we see in our Newsletter. Inaugural lectures by new department members are for example also very interesting to announce in the Newsletter. The next BMS Newsletter will appear on March 15. The deadline for contributions is March 8. Please send your contributions to wendy.goemans@kuleuven.be. And finally you can also help us by talking about the Society to your colleagues and students. The Belgian Mathematical Society's mission is to assemble all Belgian Mathematicians (including foreign mathematicians working in Belgium or abroad) and to defend their interests. It is important for every mathematician to join our Society so that we can be representative for Mathematics in Belgium.

And remember...

You can follow BelgianMathS on twitter and tweet announcements or other interesting information to [@BelgianMathS](https://twitter.com/BelgianMathS).

We also have a facebook page: <https://www.facebook.com/BelgianMathS>. This page is your page! Please help us to keep it up to date and interesting by sending us nice links and information to Yvik Swan yvik.swan@ulg.ac.be.

Philippe Cara,
BMS president

1 News from the BMS & NCM

1.1 Membership dues for 2018

With the new year also comes the time to renew your BMS membership.

The basic BMS membership fee remains unchanged: 20€ per year. See Section 1.2 for reciprocity membership.

You can either pay via bank transfer (BIC: GEBABEBB / IBAN: BE70 0011 7447 8525)

or via PayPal (see bms.ulb.ac.be/membership/paypal.php).

Our address is:

Belgian Mathematical Society
Campus de la Plaine, C.P. 218/01
Boulevard du Triomphe
B-1050 Brussels, BELGIUM

As a member,

- you will receive five times a year **BMS-NCM NEWS**, the newsletter of the **BMS** and of the National Committee for Mathematics (**NCM**), containing information on what's going on in Mathematics in Belgium.
- you will receive the "**Bulletin of the BMS - Simon Stevin**", a periodical containing peer reviewed papers as well as book reviews. If you prefer not to receive the Bulletin of the BMS-Simon Stevin on paper, you can get it electronically. See Section 1.5 for details.
- you will benefit from reciprocity agreements with the AMS, EMS, DMV, LMS, RSME, SMF, SBP-Mef, VVWL and KWG. This means you get a reduced membership fee for these societies. In case you are already member of one of these societies, your membership fee for the BMS is reduced to 18€. Details can be found on bms.ulb.ac.be/membership/reciproc.php
- you give our Society the possibility to develop actions: organizing meetings, promoting Mathematics and lobbying with the authorities.

Some realizations of our Society: the **BMS** has conceived and promoted the online access to **Zentralblatt** in the Belgian universities; the BMS also grants (financial) support for initiatives aimed at (future) mathematics students (see Newsletter #113, May 2017, for the application procedure); the BMS organises joint conferences with other mathematical societies or events like the PhD-days.

1.2 Reciprocity and combined membership

The BMS has reciprocity agreements with the AMS, EMS, DMV, LMS, RSME, SMF, SBPMef, VVWL and KWG. In case you are already member of one of these societies, your membership fee for the BMS is reduced to 18€. Details can be found on bms.ulb.ac.be/membership/reciproc.php

We summarize the most common combined memberships:

BMS	20,00€
BMS with reciprocity	18,00€
BMS + EMS	45,00€
BMS + EMS with reciprocity	43,00€

Note that the EMS (European Mathematical Society) membership fee of 25,00€ is allowed only to persons belonging to an EMS corporate member society, such as the BMS. The individual EMS membership fee is 50,00€ otherwise.

Note that it is now preferred that you pay your EMS membership fee directly to the EMS. See http://www.euro-math-soc.eu/ems_payment_new/ems_payment_new.html for details.

For your convenience however, it is still possible to pay for a combined EMS+BMS membership (i.e. 45,00€ or 43,00€) by bank transfer (BIC: GEBABEBB / IBAN: BE70 0011 7447 8525) or PayPal. We will then forward your EMS membership fee to the European Mathematical Society.

1.3 Checking your membership status

To check whether we have received your dues, go to our [online database](#).

Try typing your family name in the search box. If you agreed to have your institution and e-mail in our public database at the time you became a member, you will see your institution and e-mail address. You will also see the year in which you last paid your dues.

If you forgot to pay for more than one year, you will get no response from our database as you are not a member anymore! In this case we suggest you to re-apply for membership by filling out the online form at bms.ulb.ac.be/membership/appliform.php and transfer your membership fee asap.

1.4 Address changes

If you would like to alter the information we use to communicate with you (e-mail and/or postal address) or anything else about your membership, you can either fill out the membership form at bms.ulb.ac.be/membership/appliform.php or contact the secretary of the Society at bms@ulb.ac.be.

1.5 Electronic version of the Bulletin

We remind you that it is possible to convert your paper subscription to the Bulletin of the BMS into the electronic version of the Bulletin. If you are interested, please contact Philippe Cara by e-mail (pcara@vub.ac.be with bms@ulb.ac.be in cc) for details. You will receive a special “subscriber code” with which you can register for the Bulletin of the Belgian Mathematical Society at Project Euclid (<https://projecteuclid.org/>).

2 Meetings, Conferences, Lectures, ...

2.1 International Francqui Chair 2017-2018

Multimodal data analytics in the age of big data

From January to June 2018, we will have the pleasure of hosting Prof. Robert Calderbank, Duke University, as International Francqui Chair holder supported by VUB (hosting institute), UGent, UCLouvain, KULeuven, and ULB.

Prof. Calderbank is going to deliver a series of lectures at VUB, UGent, UCLouvain, KULeuven, and ULB on a rich set of subjects revolving around electrical engineering, applied mathematics and computer science.

We would like to cordially invite you to attend the lectures by Prof. Calderbank, which will be followed up by a networking reception. Please find the information related to each lecture on the poster at the end of this newsletter and in the links below, where you can also register for each individual event.

- Inaugural lecture at the University Foundation in Brussels, January 18, 2018
Remembering Shannon
<http://www.vub.ac.be/en/events/2018/remembering-shannon>
- Lecture at VUB, February 15, 2018
Recent Developments in Quantum Computing
<http://www.vub.ac.be/en/events/2018/recent-developments-in-quantum-computing>
- Lecture at UGent, March 1, 2018
Enhancing Resolution in Undersampled Physical Imaging
<http://www.vub.ac.be/en/events/2018/enhancing-resolution-in-undersampled-physical-imaging>
- Lecture at UCLouvain, March 22, 2018
Golay, Heisenberg and Weyl
<http://www.vub.ac.be/en/events/2018/golay-heisenberg-and-weyl>
- Lecture at KULeuven, April 27, 2018
5G Wireless
<http://www.vub.ac.be/en/events/2018/5g-wireless>
- Lecture at ULB/VUB, May 3, 2018
Coding Theory and Computer Architecture
<http://www.vub.ac.be/en/events/2018/coding-theory-and-computer-architecture>
- Lecture at VUB, May 18
Data+
<http://www.vub.ac.be/en/events/2018/data>

Looking forward to seeing you at the lectures.

Prof. Nikos Deligiannis and Prof. Jan Cornelis, VUB, on behalf of all promoters:

Prof. Aleksandra Pizurica and Prof. Marc Moeneclaey, UGent

Prof. Laurent Jacques and Prof. Luc Vandendorpe, UCLouvain

Prof. Marc Moonen, KULeuven

Prof. Christine De Mol, ULB

2.2 Methusalem Lecture Series

Lectures and Mini-Courses in Pure Mathematics

KU Leuven, Department of Mathematics

A series of colloquium talks for a broad pure mathematics audience and specialized mini-courses in algebra, analysis and geometry.

Upcoming colloquium talks (Heverlee Campus in Leuven):

Jean-Baptiste Teyssier (KU Leuven)	February 15, 2018	16:15-17:15
Jorge Castillejos Lopez (KU Leuven)	March 15, 2018	16:15-17:15
Thibault Pillon (KU Leuven)	April 12, 2018	16:15-17:15
Alexander Bufetov (Aix-Marseille University)	TBA	

For titles and abstracts, room number and the full schedule, please visit

<https://wis.kuleuven.be/methusalem-pure-math/activities>

2.3 February 2018

VVWL-jaarvergadering
Jean-Marie Dendoncker over de cardioïde en de realisatie in 3D-printing
André Piens over de geschiedenis van de wiskunde in de vorige eeuw

February 24, 2018

UGent

See the announcement at the end of this Newsletter and the new website www.vvwl.be.

2.4 March 2018

Conférence du Professeur Alain Goriely (Université d'Oxford et Directeur de l'Oxford Centre for Industrial and Applied Mathematics)

“Le Cerveau et les Mathématiques: Croissance et Traumatisme, Modèles et Solutions”

March 12, 2018, 18h00

Université Libre de Bruxelles

Cette conférence est organisée par le Fondation Philippe Wiener-Maurice Anspach.

Abstract

Le cerveau humain est l'objet ultime de notre égocentrisme intellectuel. C'est aussi une source formidable de problèmes scientifiques et un organe d'une complexité telle qu'il n'est pas clair qu'une approche mathématique soit possible. Durant cet exposé je vais considérer plusieurs problèmes de modélisation liés au cerveau. En utilisant des nombres et des lois d'échelles, on essaiera de déterminer si le cerveau humain est aussi remarquable qu'on le pense. En partant de la géométrie, on verra comment les formes circonvolues du cerveau apparaissent et comment elles sont liées au développement de la boîte crânienne. Grâce à la physique, on verra aussi qu'il est

possible de développer des modèles simples qui nous apprennent ce qui se passe lors d'un traumatisme crânien. Finalement, on se posera la question essentielle de savoir si l'on peut développer des modèles de démence avant de perdre la raison.

L'évènement est gratuit mais il est nécessaire de s'inscrire via cette page : goriely.eventbrite.com

Le lieu exact de la conférence sera communiqué prochainement aux personnes inscrites et sur le site de la Fondation (fwa.ulb.ac.be).

Contact : fwa.relations@ulb.ac.be

2.5 April 2018

Dutch Mathematical Congress (NMC 2018)

April 3 & 4, 2018

Veldhoven (close to Eindhoven), the Netherlands

On the one hand there will be 6 plenary speakers of international renown, while on the other there will be many parallel activities, including minisymposia, a poster session, a lunch session organized by the European Women in Mathematics, a session of the Study Group Mathematics with Industry, speed dating with industry, and much more.

See the announcement at the end of this Newsletter and the website

<https://www.wiskgenoot.nl/congressen/nmc>.

3 PhD theses

Adaptive resolution approach in simulation of complex polymer structures

Jakub Krajniak, KU Leuven

January 12, 2018

Thesis advisors: Prof. Dr. Giovanni Samaey (KU Leuven) and Prof. Dr. Eric Nies (KU Leuven)

Summary

The problems in polymer-based composites are challenging multiscale problems, involving multiple time and length scales. From the detailed interface interactions to macroscopically observable mechanical failure, the time and length scales range from femtosecond and sub-angstrom to years and meters

respectively. Computer simulations predicting the behaviour at the largest scales from the finest atomistic details remain impossible in the foreseeable future. Therefore, coarse-grained models are usually used, which approximate the material behaviour directly at the scale of interest. Such approximations result in acceptable simulation times, but at the expense of losing information on the scales that have been coarse-grained out. However, to understand processing-structure-property relationship for new materials, also atomistic/molecular structure information is required. Therefore, development and application of multiscale modelling techniques that can simulate at the scale of interest, while retaining atomistic/molecular information is one of the main challenges in computational materials science.

www.kuleuven.be/doctoraatsverdediging/fiches/3E13/3E130457.htm

Asymptotics for orthogonal polynomials and high-frequency scattering

Peter Opsomer, KU Leuven

February 13, 2017

Thesis advisor: Prof. Dr. Daan Huybrechs (KU Leuven)

Summary

Calculations in scientific software require more computational time and computer memory as the problem size increases. The aim of my thesis is to exploit so-called asymptotic (means the bigger a parameter, the larger the accuracy) behaviour. For example, the level at which you set a cooking fire corresponds to a final temperature. The larger the time expired since you turned on the cooking fire, the better that final temperature is approximated. Not everything is proven mathematically in this thesis, but program code is available for everyone in the world that confirms the correctness.

Orthogonal polynomials frequently occur in the scientific literature and can be approximated by a row of consecutive numbers. My thesis suggests replacing this by one formula such that less computational time is needed. To make sure that this gives an equally accurate result, there should be enough terms in the formula. We have the computer automatically and efficiently calculate this formula once, such that we can just fill in a few parameters afterwards. An application is so-called Gauss quadrature, which for example says at which points in time you should measure the temperature to obtain an accurate average with as few measurements as possible. For this, we also compose such quickly calculated formulae, which were mostly unknown in science.

My thesis also treats the scattering of sound waves. Applications are for example the calculation of acoustics in a concert hall, finding underground reservoirs with sound waves and the treatment of cancer with ultrasound waves (pitches/frequencies that are so high that you cannot hear them any more). These waves have many vibrations over a certain distance, all of which a computer program should take into account. Nevertheless, at high pitches, sound behaves as light rays that bounce back when they hit an obstacle. So, not all places on obstacles interact with each other, which we can utilize such that less computer memory is needed. The efficient, automatic and robust method ensures that the problem is easier to solve with a negligible error. In a last part of the research, we can exploit that rays can also keep bouncing between obstacles. For this, we calculate how the solution vibrates after many reflections. There also is a physical explanation and the results give insight into the behaviour of sound waves at high pitches.

www.kuleuven.be/doctoraatsverdediging/fiches/3E13/3E130509.htm

4 Job announcements

4.1 From KU Leuven

Valorisation manager Computational Mathematics and High Performance Computing

The NUMA (Numerical Analysis and Applied Mathematics) section of the Department of Computer Science of KU Leuven aims at the development of numerical methods, algorithms and software for simulation and data analysis, with applications in many fields in science and engineering. The section consists of 11 professors, 5 postdoctoral researchers and 33 PhD researchers. Research topics include numerical linear algebra, tensor-based data analysis, model order reduction, optimisation, multi-scale modelling, high performance computing, uncertainty propagation, quasi-Monte Carlo techniques.

Responsibilities:

- exploration of opportunities for potential projects and match-making between technologies available in the consortium and the identified industrial needs;
- contributing to the strategic planning of research and tech transfer agenda of the research unit;
- identification of funding mechanisms, forming or joining project consortia and active involvement in project negotiation phase and proposal writing;
- acting as a contact person of the research unit for external partners;
- handling consultancy, research, licensing, confidentiality and non-disclosure agreements;
- project management with a particular attention to valorization components of the projects;
- management of IP rights generated in the projects;
- increasing visibility of the research unit and promoting its brand in the private sector;
- expanding the capacity of the consortium to execute short- and mid-term projects with industry.

Profile

The candidate must possess:

- a PhD degree in either Engineering, Computer Science or Applied Mathematics and at least 3 years of proven research experience after PhD including tech transfer and/or collaborations with companies;
- experience in networking with companies, building business relationships and preparing project proposals in consortia with industrial involvement;
- a proven track record of project proposal writing and good knowledge of national and international funding schemes;
- experience in presenting research at industry-oriented events or conferences;
- experience in managing research projects, in supervising PhD students and/or postdoctoral researchers and in coordinating research;
- software design skills (in particular modernizing scientific codes) and experience with simulation tools used in the industry;

- excellent communication skills in English, both verbally and in writing;
- a working knowledge of intellectual property rights in the domain of ICT.

In addition, he/she must have expertise in at least two of the following topics:

- High Performance Computing
- Uncertainty propagation, numerical optimization, model order reduction for simulation
- Large scale data analytics
- Multi-scale modeling

Offer

We offer a permanent position as a valorisation manager at a top university in the center of Europe in a well-equipped and experienced multidisciplinary research unit. The position provide opportunities to collaborate internationally with research groups and industrial partners.

Interested?

For more information please contact

Prof. dr. ir. Dirk Roose, tel.: +32 16 32 75 46, mail: dirk.roose@kuleuven.be or

Prof. dr. ir. Karl Meerbergen, tel.: +32 16 32 79 59, mail: karl.meerbergen@kuleuven.be.

See also the announcement at <https://icts.kuleuven.be/apps/jobsite/#/vacatures/54447285>.

5 History, maths and art, fiction, jokes, quotations ...

5.1 Adhemar's corner

This newsletter reviews from Adhemar Bultheel are about the female (black) mathematicians in the computing group at NASA research centers in Langley and in Pasadena in the period 1940-1970. The first one, *Hidden Figures*, is about the book by Margot Lee Shetterly and about the corresponding film directed by Theodor Melfi. The second review is about the book *Rise of the Rocket Girls* by Natalia Holt.

Hidden Figures, (book) *Margot Lee Shetterly*, William Morrow and Company, (2016) ISBN 978-0-062-36359-6 (hbk), 368 p.

Hidden Figures, (movie) Theodor Melfi (director), Fox 2000 Pictures, 2016, 127 min.



The book tells the story of the *Langley Research Center* of the *National Advisory Committee for Aeronautics* (NACA), founded in 1915. The center designed and tested experimental and supersonic airplanes before and during the second World War. In October 1958 it became part of the *National Aeronautics and Space Administration* (NASA) under president Eisenhower. When the USSR brought Yuri Gagarin as the first man in a single orbit in space in April 1961, president John F. Kennedy has put a lot of pressure to win the space race for the moon. Langley did tests and simulations that would eventually bring the USA alongside the USSR. They succeeded in February 1962 bringing John Glenn up there as the first American orbiting earth. Much later, in 1969 Apollo 11 brought Neil Armstrong and Buzz Aldrin to the moon.



The period covered in the book is from early 1940s till end of 1960s. The 50s and 60s coincide with the *Civil Rights* movement with people demonstrating and fighting against segregation of black Americans in courts of law. The Jim Crow laws enforced black and white children to have separate schools, there were separate seats in public transportation and restaurants, separate toilets, separate theaters, etc. It was only in 1954 that the Supreme Court in *Brown v. Board of Education* banned segregation in all public schools. Black highly qualified scientists did not get a position at a white university. So they had to take up a position in smaller black colleges. So, black students sometimes got a better education there than at the bigger universities. When during WW II many men, black as well as white, were sent out to fight, there was a group of highly qualified black women hired as (human) computers in Langley.



Dorothy Vaughan



Mary Jackson

Dorothy Vaughan quit her low paid job as a teacher to enter the computing group at Langley as did several other black female mathematicians. After a number of years, she became the de facto supervisor of this group, who worked in the segregated Western part of Langley and therefore the group became known as the *West Area Computers*. There was a white East Wing equivalent, still mainly consisting of women. The first part of the book is primarily following Dorothy in her private life and how she and several others became one of

the computers at Langley. Meanwhile the history of the research center as well as the problems associated with segregation are well documented. Several of the women that entered as computers were detached to work in more specialized groups along white and male colleagues. Among them three more women are outlined with more detail in the book.

Mary Jackson who got a master in mathematics and physical sciences from Hampton Institute in 1942

was one of them. Her application to study at the University of Virginia was turned down. After several other jobs, she joined Dorothy's group in 1951 where her talents were discovered by the wind tunnel engineer Kazimierz Czarnecki who asked her to work in his team. She can however not be appointed as an engineer since the rules were modified: a degree from the University of Virginia was required. So she took this to the court and was allowed to start an engineering degree at the University of Virginia which she obtained in 1958. Still much later she met, as a woman, the glass ceiling at Langley and became NASA's Federal Women's Program manager.

Also Christine Mann (after her marriage she became Christine Darden) with a mathematics degree obtained in 1962 joined the West Computers group and became a specialist in supersonic flight and sonic booms. She was the first black female that got promoted to a senior executive position at Langley.



Christine Darden



Katherine Johnson

The most mythical however was Katherine Goble (later Katherine Johnson when she remarried after her first husband died). She got adopted in the *Flight Research Division* that had to compute the re-entry trajectory of the Freedom 7 capsule that should bring John Glenn in orbit. Space travel posed new, unknown challenges to the engineers, and Katherine contributed her part in developing the new mathematics. The meeting of the board used her numbers and reports, but females were not allowed at those meetings. However, thanks to her persistence, she finally was allowed to attend. She also finished a report on the ballistic trajectory that should define the entry point in the atmosphere that would let the Mercury capsule splash down in the ocean at some predefined point. Alan Shepard was the first American in space in May 1961, but that was a rehearsal for John Glenn's orbiting flight. By that time NASA's nerve center was moved to Houston and many of Langley's employees



had to move too. Katherine decided to stay in Langley. When Glenn was about to take off, the computer programs were checked and double checked, but Glenn asked "the girl" (i.e., Katherine) to verify the numbers, which she did. Relying on electronic computers was still not as accepted as it is today.

Katherine's confirmation of the result made Glenn confident to indeed take off and this incident boosted Katherine's mythical fame.

When in the previous decade electronic computers had entered NACA in the 1950s, the West Computing group was reduced, many of its members were already working in permanent position in other subgroups. When in 1958 NACA became NASA, the group consisting of only 9 women was closed down and the remaining team was dispatched to different divisions. However Dorothy had taken programming courses and she was assigned to the *Analysis and Computing Division*, which was Langley's computing center equipped with big mainframe IBM computers.

The period after 1962 is wrapped up in two chapters. Several of the black West Computers got respectful positions, while they were working on the preparation of Kennedy's target to bring an American to the moon. Somehow the introduction of *Star Trek* in 1966 with an international and interracial crew was reflecting the ideal future that the Civil Rights Movement was marching for. Uhura was a black

communication specialist of the Enterprise crew. One of the first characters on screen with an African descent. Katherine was a Trekkie fan, as was Martin Luther King. The book ends with the touch down of the Eagle on the moon and Katherine already thinking of the next step to take. The more recent history and what became of the main characters is told in an epilogue. Katherine got the Presidential Medal of Freedom in 2015 from President Obama.

As mentioned before, the book is very well researched and almost half of the book consists of references to newspapers, and other publications, and many notes to give extra background information. Since the stories of the women that are followed, the historic development of the Langley research center and the history of the segregation and the Human Rights movement are mixed, yet are treated in chapters mainly devoted to one of them, the account is not always sequential and therefore a bit chaotic which is unavoidable with all the details and background provided.



Henson (Katherine) Monáe (Mary) Spencer (Dorothy)

Theodor Melfi

The film is faithful to the idea of the book, but it has much more of an entertainment factor and is less of a documentary. There are only 3 main characters: Dorothy (Octavia Spencer), Mary (Janelle Monáe), and the main star of the film is Katherine (Taraji P. Henson). The screenplay is compressing the dramatic elements. The war period of NACA is left out and the focus of the action is building up a climax towards John Glenn being launched at Cape Canaveral. In the film, Katherine at that moment had already returned to the West Computers when Glenn on his way up to the Mercury capsule asked “the girl” to check the numbers. Katherine is summoned and finishes her computations at the very last second.

There are certain discrepancies between film and book, with the latter telling the true story. For example the engineer that hired Mary is called in the movie Karl Zielinski. The head of the Space Task Group is in the movie Al Harrison (Kevin Costner) which was in reality Robert Gilruth. Harrison is the “good guy” who really appreciates Katherine’s skills. Since she has to run to another building to use the colored toilets, Harrison asks her why she is so often away when he needs her. That is when she, in an outburst, lists all the discriminating rules about the bathroom, the separate coffee pot she has to use, etc. Then Harrison proclaims there is no more segregation under his supervision and tears down the colored toilet signs. In the book it is actually Mary who obtains this victory.

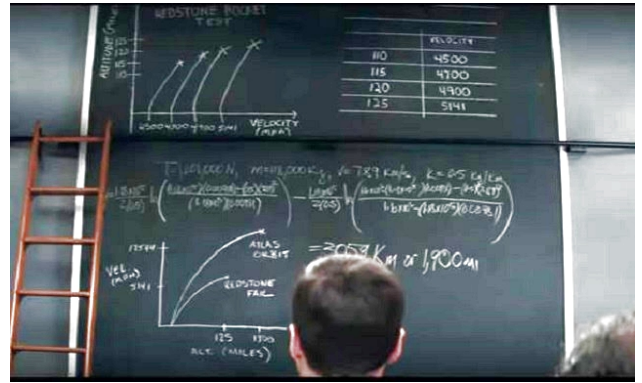
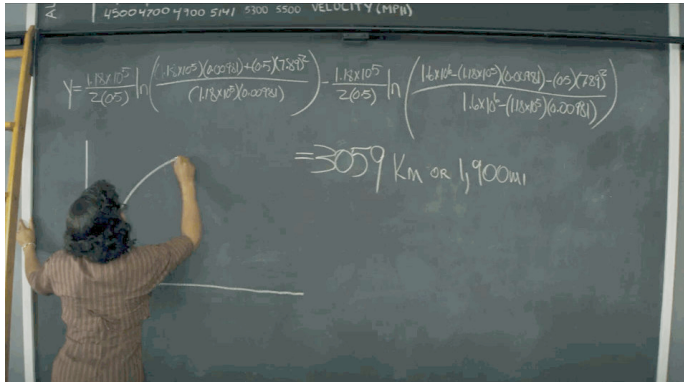
The “bad guy” in the movie is Paul Stafford (played by Jim Parsons) who has a hostile attitude towards Katherine while she has to work for him. He asks her to verify his computations and gives her documents that are almost completely blacked out because she does not have the security clearance. When she asks for more info, he says she didn’t really have to check his numbers because it is only a formality. When she holds the pages against the light she can see the word **ATLAS** which is the rocket that would bring the capsule into orbit because the Redstone carrier was not strong enough but that was supposed to be ‘top secret’. However using this info she can do the whole computation. This made her reputation in the group. Stafford still holds a grudge and when later she adds her name to the reports she has prepared, he repeatedly orders her to remove it.

Of course also romance gets its place in the movie as Katherine meets her second husband army officer Jim Johnson. As a dedicated feminist, she is at first giving him a hard time for his disbelief that a woman can do a job she is actually doing. But they finally get married encouraged by her teenage daughters.

In the movie Dorothy is acting leader of the West Computing group and repeatedly asks the bitchy supervisor Vivian Mitchell (Kirsten Dunst) to make this official, but it was never granted unless at the

very end when she succeeded in starting up the IBM computer something that the engineers could not. Dorothy however refuses the position unless she can take her West Computing group along. She had indeed instructed her group to become FORTRAN programmers. So Mitchell had to give in and at the head of her troop of black computers (many more than the nine of the book), she invades victoriously the computer building. In reality she was indeed officially the head of the West Computers.

The mathematics are almost not present in the book, certainly not the details and formulas. There are however equations in the movie. They look cool but may not be realistic.



Top: using the ATLAS data Katherine can compute what will bring the Mercury capsule into orbit.
 Bottom left: Katherine computes the re-entry point in the atmosphere off the top of her head during the meeting which provoked Glenn to remark that ‘he likes the girl’s numbers’
 Bottom right: Katherine uses Euler’s method to solve the differential equation numerically.

Katherine is detached to Harrison’s task force because he required a mathematician who knew analytic geometry. Katherine was the only qualified one and upon her arrival, Harrison asks her if she can compute the Frenet frame for certain data, and she answers affirmative and proposes to use the Gram-Schmidt orthogonalization algorithm. This convinces Harrison that she is indeed good and assigns her to Stafford. One of the main problems Katherine solves is the transition from the elliptical orbit to the parabolic trajectory of the capsule falling back to earth. When Harrison complains this is ‘new math’ they do not know yet, Katherine has an aha moment and says that it is not ‘new math’ but ‘old math’ that will bring the solution, referring to Euler’s method. That is the simplest numerical method to solve differential equations and an obvious thing to do now, but then in the early sixties, numerical mathematics was still in its infancy and people still tried to solve differential equations analytically.

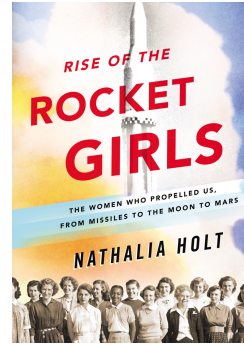
In an interview for the *Los Angeles Times*, Katherine Johnson is asked “Do you have any advice for young women and people of color today who want to pursue a STEM career?” and her answer is “Just do it. Take all the courses in your curriculum. Do the research. Ask questions. Find someone doing what you are interested in! Be curious!”.

When you are interested in the history and the life of the women behind the story, I would recommend the book. It may be a bit dry with all the details added, but you will get a broader view. For a more emotional kick, building up to a climax with a happy ending and peppered with some romance, a good and a bad guy and of course the triumphing black heroines, you should go and see the film.

Adhemar Bultheel

Rise of the Rocket Girls, *Natalia Holt*, Little, Brown and Company, (2016) ISBN 978-0316338929 (hbk), 352 p.

This book tells the story of the women hired as computers at Jet Propulsion Laboratory (JPL) in Pasadena, CA. This lab was specialized in designing the rockets, originally with the intention of weaponry using the knowledge of Wernher von Braun, inventor of the Nazi V-2, who is then working in a lab in Alabama. Later JPL participated in the space race as it became part of NASA in 1958. When digital computers were introduced, they initially were only a back-up for the women tapping away on their Friden calculators. However, as machines became more reliable, the women transformed into the programmers of the mainframe machines.



Natalia Holt

The book covers the period 1940's, 50's and 60's. The start of JPL, and the background of some of these female computers. Later in the book it becomes basically an enumeration, almost month after month, of test launches often turning into disasters and the women computing the amount of fuel required or the trajectories the rockets were supposed to follow. Because the USA were losing the space race against the USSR, their work was always under pressure. The history is told from the viewpoint of the women working under male engineers, but they really did the bulk of the work while their name only scarcely appeared on the publications. Most of these women are white, but, being women they had to fight for gender equality. The book is also involved in many girlie aspects like engagements, marriage, pregnancy, child birth, nanny and babysitter problems, divorce, fashion, the introduction of the pill, the pantyhose, etc. In the background, yet with impact on their work, we hear the rumble of historic events like Pearl Harbor, the Cuba crisis, Sputnik, Laika, and Gagarin, the murders of J.F. Kennedy and Martin Luther King, and much more. The book ends with a group of retired women visiting the modern JPL premises.



JPL computers 1953.

© NASA/JPL

One of the first women at JPL was Macie Roberts who was the supervisor of the group. But we are also introduced to Helen Ling, Barbary Paulson, Sue Finley, and many others that are on the picture above. Janez Lawson was special in the group since she was the only black woman and she had an engineering degree in chemistry. These women helped develop the multistage rockets, the casing of the rockets, the nose cones, gravitational slingshots, and many other challenges they had to overcome, maneuvering where none had gone before. They had to deal not only with the failing of the rockets, but also with the early unreliable digital computers, handling stacks of punched cards, punched paper tapes, etc. At later stages they were working in other projects such as launching planetary missions to Venus, Mars, and Mercury.

There seems to be an outburst of books devoted to women's emancipation and their important role in opening STEM (science, technology, engineering, and mathematics) careers for women. For a long time women worked under the supervision of male engineers, and although they were essential in analyzing the data, and they did the bulk of the work, they stayed in the background and their name was rarely mentioned on the cover of the reports and the publications, if at all on the inside. Many of them had a particular interest in mathematics or engineering and took courses in an almost exclusively male environment. They were engaged to do the computational work and do the data processing that, as more reliable digital computers were introduced, was taken over by machines. As these human computer units were gradually closed down, many of these women became computer programmers. These women did not have an engineering degree but they grew into their work and after a while they were as good in the engineering work as the male engineers. On the other hand, these books create the wrong impression as if this was a purely female business. Female employers usually got a lower salary than their male colleagues and so became a group often forming a bond or sisterhoods of 'we females' in the predominantly male companies.

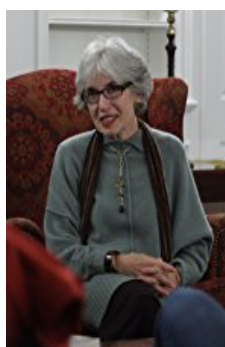
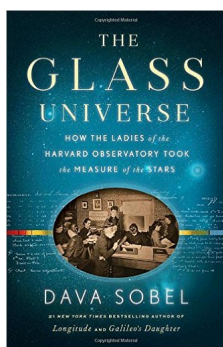
Here are some other books that I did not read, but that tell us about the same story as what is in *Hidden Figures* (for the black computers of Langley) and in *Rise of the Rocket Girls* (for the white computers of JPL in Pasadena).



G.D. Morgan

Rocket Girl: The Story of Mary Sherman Morgan, America's First Female Rocket Scientist George D. Morgan, Prometheus Books (2013)

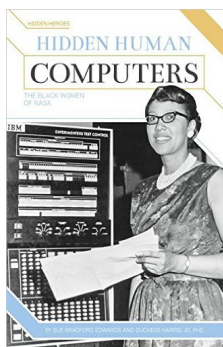
As a chemist, not a computer, Mary Sherman worked for *North American Aviation* at Canoga Park, Los Angeles where she computed the performance of new rocket propellants. She designed a new one that fuelled the rockets tested in JPL. The success was the result of the minds of Wernher von Braun and Mary Sherman. While von Braun became an illustrious personality, Mary sank into oblivion. The author George Morgan is her son.



D. Sobel

The Glass Universe: How the Ladies of the Harvard Observatory Took the Measure of the Stars, Dava Sobel, Viking (2016).

Women were hired as human computers working on data collected by male astronomers, but gradually they studied the glass photographic plates on which stars were registered. They could analyze the material stars were made of and divide them in categories, detected novae, and designed a generally accepted classification system of stars.



S. Bradford Edwards

Hidden Human Computers: The Black Women of NASA (Hidden Heroes) Sue Bradford Edwards, Essential Library (2016)

It tells about the same story as *Hidden Figures* of the female computers who worked for NACA and NASA from 1940 till 1960, and who gradually became computer programmers as digital computers entered the field. Sue Bradford Edwards is the granddaughter of one of these computers, Miriam Daniel Mann.

INTERNATIONAL FRANCOU CHAIR 2017 – 2018: MULTIMODAL DATA ANALYTICS IN THE AGE OF BIG DATA



INAUGURAL LECTURE REMEMBERING SHANNON

Prof. Dr. Robert Calderbank

Promoters: Prof. Dr. Nikos Deligiannis (VUB)
& Prof. Dr. Jan Cornelis (VUB)

WHEN:

Thursday January 18 at 16:00

WHERE:

Room Félicien - Cattier Egmontstraat 11 - 1000 Brussels

The lecture will be followed by a reception



Prof. Calderbank is professor of Electrical Engineering at Duke University where he now directs the Information Initiative at Duke (iiD) after serving as Dean of Natural Sciences (2010-2013). Dr. Calderbank was previously Professor of Electrical Engineering and Mathematics at Princeton University where he directed the Program in Applied and Computational Mathematics. Prior to joining Princeton in 2004, he was Vice President for Research at AT&T, responsible for directing the first industrial research lab in the world where the primary focus is data at scale. Prof. Calderbank served as Editor in Chief of the IEEE TRANSACTIONS ON INFORMATION THEORY from 1995 to 1998, and as Associate Editor for Coding Techniques from 1986 to 1989. He was a member of the Board of Governors of the IEEE Information Theory Society from 1991 to 1996 and from 2006 to 2008. Dr. Calderbank was honored by the IEEE Information Theory Prize Paper Award in 1995 for his work on the Z4 linearity of Kerdock and Preparata Codes (jointly with A.R. Hammons Jr., P.V. Kumar, N.J.A. Sloane, and P. Sole), and again in 1999 for the invention of space-time codes (jointly with V. Tarokh and N. Seshadri). He has received the 2006 IEEE Donald G. Fink Prize Paper Award, the IEEE Millennium Medal, the 2013 IEEE Richard W. Hamming Medal, the 2015 Shannon Award, and he was elected to the US National Academy of Engineering in 2005.

LECTURE PROGRAM

Thursday, 18 January, 2018 - 16:00

Room Félicien Cattier

Egmontstraat 11 - 1000 Brussels

Inaugural lecture title: Remembering Shannon

Thursday, 15 February, 2018 - 16:00

VUB, Brussels Humanities, Sciences & Engineering campus, U-Residence

Title: Recent Developments in Quantum Computing

Thursday, 1 March, 2018 - 16:00

Complex Plateau

UGentJozef Plateaustraat 22 - Gent

Title: Enhancing Resolution in Undersampled Physical Imaging

Thursday, 22 March, 2018 - 16:30

BARB93 auditorium, Sainte-Barbe Building

Louvain-la-Neuve

Title: Golay, Heisenberg and Weyl

Friday, 27 April, 2018 - 16:00

Aula van de Tweede Hoofdwet

Thermotechnisch Instituut Kasteelpark Arenberg

Title: 5G Wireless

Thursday, 3 May, 2018 - 16:00

VUB, Brussels Humanities, Sciences & Engineering campus, U-Residence

Title: Coding Theory and Computer Architecture

Friday, 18 May, 2018 - One day workshop

VUB, Brussels Humanities, Sciences & Engineering campus, U-Residence

Title: Data+

REGISTRATION TO EACH

INDIVIDUAL LECTURE VIA:

VUB.BE/EN/FRANCQUI2017-2018



**Come to the Dutch Mathematical Congress (NMC 2018)
on April 3 & 4, 2018**

Register before December 27, 2017: Early Bird fee

NEW this year:

- NMC 2018 will be held in [Conference Center Koningshof](#) (located in Veldhoven, close to Eindhoven). Overnight stay included
- Evening program and afterwards drinks in the “metro bar”/Irish pub
- Lunch session by the European Women in Mathematics
- Session on [Study Group Mathematics with Industry](#)
- Special session with presentations by former Math PhD’s now working in industry
- Speed dating with industry, opportunities to interact with companies
- Presentation of the Mathematics Council
- Presentation by Stan Gielen, chair NWO

Plenary speakers:

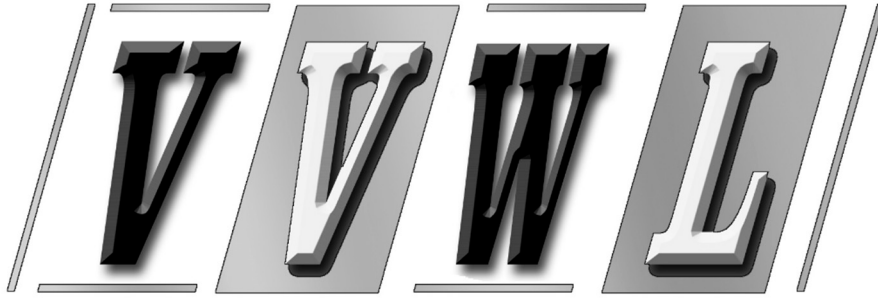
- [Jean-Francois Le Gall](#) (Université Paris-Sud Orsay, Probability & Statistics Group)
- [Adriana Garroni](#) (Università di Roma La Sapienza, Department of Mathematics Guido Castelnuovo)
- [Fernando Rodriguez Villegas](#) (Abdus Salam International Centre for Theoretical Physics; Beeger Lecture)
- [Yi Ma](#) (University of California at Berkeley, Department of Electrical Engineering and Computer Sciences)
- [Bruno Stoufflet](#) (VP of R&D and advanced business @ Dassault Aviation)
- [William Slofstra](#) (Un. Of Waterloo, Institute for Quantum Computing)

Parallel sessions: DISC, DIAMANT, GQT, NDNS+, STAR, CompSci, NETWORKS, QuSoft, Machine Learning, Math PhD’s working in industry, Study Group Mathematics with Industry, KWG PhD prizelaureates & Stieltjesprize winners, and the annual afternoon session for high school teachers (“Docentendag”), including lectures by the competitors for the Pythagoras ProfielWerkstuk Prijs.

Postersessions on both days. To **submit a poster** please send an email with subject **NMC2018 Poster** containing the poster title and the names of the authors to nmc@wiskgenoot.nl

If you wish to benefit from the **the early bird fee** (€110 pp for sharing a 2p room, €150 for a 1p room; including dinner and social event) please [register on the website nmc.wiskgenoot.nl](http://nmc.wiskgenoot.nl) before **December 27, 2017!**

With regards,
The organizers
email address: nmc@wiskgenoot.nl



Vlaamse Vereniging Wiskunde Leraars

Beste VVWL-leden, beste collega's,

Vooreerst, namens het voltallige VVWL-bestuur, wens ik jullie allen - in alle opzichten – een opperbest nieuwjaar 2018.

Bij deze wensen wil ik jullie alvast uitnodigen op de VVWL-**jaarvergadering** op zaterdag 24 februari 2018 in Gent. Meer details zijn hieronder te vinden en op onze vernieuwde website www.vvwl.be

Het VVWL-bestuur is dringend aan uitbreiding en verjonging toe om haar taak verder behoorlijk te kunnen blijven vervullen. Ik vraag dan ook met aandrang om, zo mogelijk, je kandidatuur te stellen voor een bestuursfunctie (lees verder de modaliteiten onderaan deze bladzijde).

Ik zie er al naar uit jullie op de **jaarvergadering** te mogen begroeten, wens jullie een succesvolle voortzetting van dit schooljaar en hoop dat de VVWL daar wat kan toe bijdragen.

Arthur Schoeters
Voorzitter V.V.W.L.

Oproep voor kandidaat-bestuursleden:

Volgende bestuursleden zijn uittredend en herverkiesbaar: de dames Annie De Baere en Beatrijs Versichel en de heren Filip Moons, Arthur Schoeters, Peter Vandendriessche en Marc Van Eijmeren.

Elk VVWL-lid kan zich verkiesbaar stellen voor een functie in het VVWL-bestuur. Het volstaat een e-mail met kandidatuurstelling te zenden naar de voorzitter (arthur.schoeters@gmail.com) uiterlijk op 17 februari 2018.

Statutaire VVWL-JAARVERGADERING op zaterdag 24 februari 2018

Plaats: UGent - Wetenschapsmuseum, Campus Sterre, Gebouw S30, Ingang 3

Bereikbaarheid: zie <https://soleway.ugent.be/routes/3027>

AGENDA

9h30 : onthaal, gevolgd door het openingswoord door de voorzitter

10h-11h: Jean-Marie Dendoncker over de cardioïde en de realisatie in 3D-printing.

11h-12h: André Piens over de geschiedenis van de wiskunde in de vorige eeuw.

12h00-12h20: prijsuitreiking VVWL-wedstrijd: "Wiskunde is (een beetje) oorlog" (deel 4)

12h20-13h00: statutair gedeelte met financieel verslag en décharge van de penningmeester, jaarverslag en verkiezing van de bestuursleden en rondvraag

De nieuwe website van de VVWL.

De voorbije maanden is er hard gewerkt om de inhoud van de oude VVWL-webstek over te zetten naar de nieuwe website. Deze website is nu ook uitstekend te bekijken op tablet en smartphone en het uiterlijk oogt modern.

Naast de vertrouwde rubrieken met links, het ledentijdschrift W&O, materiaal met presentaties van de conferenties en wedstrijden werd een blog toegevoegd met interessante wiskundenieuwtjes. In een apart onderdeel zal er aandacht worden besteed aan het gebruik van ICT in de lespraktijk en meer in het bijzonder het programma GeoGebra .

Deze vernieuwde website maakt heel wat meer interactie met de leden van de vereniging mogelijk en wil een actief instrument zijn ter ondersteuning van de wiskundeleraars door uitwisseling van ideeën, lesmaterialen, praktijkvoorbeelden e.d.m.

Meer dan ooit zal de VVWL opkomen voor de belangen van de wiskundeleraars. Laat ook jouw STEM horen via www.vvwl.be en geef een boost aan de wiskunde.

Interesse om mee te helpen aan de uitbouw van de VVWL website? Neem dan contact op met webmaster ivan.dewinne@telenet.be

Eindtermencommissie hervormd secundair onderwijs

Op 1 september 2019 starten de eerstejaars uit het middelbaar onderwijs in het hervormde secundair onderwijs. Bij deze hervorming horen ook nieuwe eindtermen, die er toch wat anders zullen uitzien: eerst en vooral wil men vanuit de overheid snoeien in het aantal eindtermen. De nieuwe eindtermen zullen dus kleiner zijn in aantal, maar breder & ambitieuzer geformuleerd worden. Daarnaast worden de eindtermen niet meer per vak geformuleerd, maar in clusters. Zo hoort wiskunde tot de cluster wiskunde, exacte wetenschappen en technologie. Op deze manier schrijft de overheid niet meer expliciet voor welke inhouden in een vak moeten gegroepeerd worden, dat is een karwei voor de netten. Daarnaast maken de koepels samen curriculumdossiers waarop elk net zijn leerplan zal enten. De invoering van de curriculumdossiers zijn een poging om de leerinhouden tussen de netten te harmoniseren. Het goede nieuws is dat ook de VVWL bij de ontwikkeling van de nieuwe eindtermen zijn stem mag laten horen en dit bij monde van ons jongste bestuurslid Filip Moons. Filip is leraar wiskunde aan het Atheneum Karel Buls te Laken en praktijkassistent aan de lerarenopleiding wiskunde van de Universiteit Antwerpen. Hij zal absoluut pleiten voor het behoud van een stevige wiskundecomponent in de eerste graad. Je kan hem voor meer informatie en ideeën contacteren via filip.moons@uantwerpen.be