Report of 2019

The Finnish National Network on Mathematical Modelling is formed by the following Finnish universities and their departments (in the alphabetical order).

- Lappeenranta-Lahti University of Technology (LUT), School of Engineering Science
- Tampere University (TAU), Faculty of Information Technology and Communication Sciences, Unit of Communication Sciences.
- University of Eastern Finland (UEF) Department of Applied Physics (Kuopio)
- University of Eastern Finland (UEF) Department of Physics and Mathematics, (Joensuu)
- University of Jyväskylä (JyU), Faculty of Information Technology.
- University of Oulu (OU), Faculty of Natural Sciences, Department of Mathematical Sciences

The units/ departments share their interest and experience in mathematical modelling in order to develop and use mathematical methodology to solve important problems in science, economics and industry. The main activities of the network consist of modelling, simulation, collaboration with industry and society, in terms of projects, modelling weeks, modelling education and study groups

Education

During 2019 the network organized teaching of the "Basic Course on Mathematical Modelling" both in Finnish and English. The advanced courses on Partial differential equation on modelling (Osittaisdifferentiaaliyhtälöt mallinnuksessa) and Continuous models (Jatkuvat mallit) were given for Finnish students. The courses were taught and studied over the Internet with teachers and students from all the six nodes.

The language of education has been Finnish so far, but an international version of the basic course was prepared during 2018 and taught fall 2019.

Workshops

Workshop on Computational Modeling and Data Science, intended for fostering interaction between industrial representatives working in R&D projects and university researchers working in computational fields – broadly named as computational technology or industrial mathematics was organized by LUT in Lappeenranta 11-12.9.2019. (https://www.lut.fi/web/en/commads2019)

Project applications

EU-MATHS-IN Finland is a partner in Nordic Industrial Math Hub application submitted to NORDFORSK in 2019.

EU-MATHS-IN Finland participated in the preparation of Optimate project (DESIGN OF A EUROPEAN INFRASTRUCTURE FOR OPEN INNOVATION THROUGH MATHEMATICAL TECHNOLOGIES9, in the INFRADEV - DESIGN STUDIES program, but unfortunately due to time limitations had to give up.

The network participated INNOSUP-01-2018-2020: Cluster Facilitated Projects for New Industrial Value Chains application for Horizon 2020 with Spanish and Italian Networks. LUT is the Finnish partner.

Ongoing industrial projects include

Savon Sellu: "Modelling of time- and moisture-dependent failure of paperboard packages" with savon Sellu (LUT).

Project with defense sector "Long-distance passive Doppler-only tracking of aircraft" (LUT).

EU-project: H2020-MSCA-ITN, "Smart tomographic sensors for advanced industrial process control, TOMOCON" having 12 research institutions and 15 renowned industrial companies. The Finnish partners are Department of Applied Physics (UEF) and LUT.

TAU has participated in many industrial projects. The industrial partners include many international companies like HERE, Nokia and Microsoft.

Other

The Network is a member of Mathematics for Industry Networks (https://mi-network.org) and has a representative at COST action management committee.

The network has participated in the ECMI SIG on virtual education lead by Prof. Thomas Götz in Koblenz.

The network disseminated information on ECMI modelling week 2019 and 19th European Conference on Mathematics for Industry (ECMI 2018) for its members.

Organization

The council of the network had 9 meetings in 2019. The council members were:

    Seppo Pohjolainen TAU (chair)
    Matti Heiliö LUT (Vicechair/secretary)

Timo Tiihonen JYU
Marko Vauhkonen UEF/Physics
Jukka Tuomela UEF/Mathematics
Erkki Laitinen OU

The network has members in the following organizations
- ECMI Council (Matti Heiliö)
- EU-Maths-In Council (Seppo Pohjolainen/Matti Heiliö)
- COST: Minetwork (Matylda Jablonska-Sabuka/Simo Ali-Löytty)

Plan for 2020

The Network aims to continue its regular actions and find some new. The Network is associated with the Finnish Centre of Excellence in Inverse Modelling and Imaging supported by Academy of Finland with Aalto University (AU), Finnish Meteorological Institute (FMI), Lappeenranta-Lahti University of Technology (LUT), Tampere University (TAU), University of Eastern Finland (UEF), University of Helsinki (UH), University of Jyväskylä (UJ), University of Oulu (UO).

Education

The web based modelling education will continue. The Advanced Courses of Mathematical Modelling will be renewed, updated and translated into English so that it will be available also for foreign students.

The Network will carry on developing international eLearning and participate in ECMI SIG on virtual education.

Workshops & modelling weeks

A special workshop on Industry and Mathematics will be planned and organized in 2020 or 2021 possibly during Mathematical Days in Finland.

The network will disseminate information on ECMI modelling week 2020 and ECMI conferences to its members.

Projects

The network continues to participate in the following COST networks:

Investigation and Mathematical Analysis of Avant-garde Disease Control via Mosquito Nano-Tech-Repellents' http://www.cost.eu/ COST_Actions/ca/ CA16227. Representatives from LUT. prof Heikki Haario, PhD student Anna Schcerbacheva.

TU1304 Wind Energy Technology Reconsideration to Enhance the Concept of Smart Cities (WINERCOST) Time period: 2014-2018 Main web pages: http://www.winercost.com/. Aim and objective: http://www.winercost.com/index.php/about-winercost/aims-objectives. Representative from LUT: Dr Ashvinkumar Chaudhari

Third COST network is MI-NET with representatives Dr Simo Ali-Löytty (TUT) and Dr Matyda Jablonska (LUT).

Finnish Academy: Meriliikenteen teollinen internet. Industrial Internet and Data Analysis in Marine Industries Researchers: Prof Heikki Haario (LUT) , Dr Marko Laine (FMI) , Dr Antti Solonen (Eniram LTd)

Project title: (MATINE/ Ministry of Defense) Kaukaisten ilmavalvontakohteiden Doppler-seurannan suorituskyvyn mittauksen koelaitteisto. Instantaneous Doppler Signature Extraction from within a Spectrogram Image of a VHF Band. http://ieeexplore.ieee.org/document/7472956/, http://www.defmin.fi/en/tasks_and_activities/defence_policy/scientific_advisory_board_for_defence/matines_research Researchers: Miika Tolonen, Dr Tuomo Kauranne, LUT School of Engineering.

EU-project: H2020-MSCA-ITN, "Smart tomographic sensors for advanced industrial process control, TOMOCON" having 12 research institutions and 15 renowned industrial companies. The Finnish partners are Prof. Marko Vauhkonen from Department of Applied Physics (UEF) and LUT.

EU-MATHS-IN Finland participates in the preparation of INFRAIA EU-proposal "Infrastructure for Integrating Starting Communities in Mathematical Technologies at a European Community level (MATE4IN).

Organization

The council of the network will have about 8 meetings with the following members:

> Esko Turunen TAU (chair)
> Matti Heiliö LUT (vicechair)
> Seppo Pohjolainen TAU (secretary)
> Timo Tiihonen JYU
> Marko Vauhkonen UEF/Physics
> Jukka Tuomela UEF/Mathematics
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