

Teaching Portfolio

Konstantin Filonenko
The Maersk Mc-Kinney Moller Institute
SDU Center for Energy Informatics
Postal address:
Campusvej 55
5230
Odense M
Denmark
Email: kfi@mmmi.sdu.dk
Mobile: 29992209
Phone: 65508975



Teaching Experience

I have and have had previously various teaching responsibilities both at SDU and in private companies. I have learned the Danish education system while working as a teaching assistant in an engineering physics course for mechatronic students at Mads Clausen Institute (EPHYS). During the previous 4 years at SDU Center for Energy Informatics, I have had experience teaching 4 bachelor and 2 master courses, supervising 2 bachelor projects, 4 master projects, 5 in-company projects at the master level, co-supervising a Ph.D. project and 7 individual study projects listed below.

Teaching

Data- and Component-Based Energy System Modeling

Christian Veje, Jonathan Dallaire & Konstantin Filonenko
01/02/2021 → ...

Data Engineering and Programming (DEP)

Konstantin Filonenko
02/08/2019 → 29/02/2020

Dynamics and control of processes and systems - Modeling (DCPS)

Konstantin Filonenko
06/02/2019 → ...

Engineering Physics (EPHYS)

Konstantin Filonenko
01/09/2012 → 28/02/2013

Flow and Heat Transfer

Jonathan Dallaire & Konstantin Filonenko
01/02/2020 → 30/06/2020

Flow and Heat Transfer - Flow (FHT)

Konstantin Filonenko
25/03/2019 → ...

Mathematical Methods in Programming (MPRG)

Konstantin Filonenko
01/09/2017 → 28/05/2019

Modeling based on first principles

Konstantin Filonenko
19/08/2017 → 19/08/2017

Professional Self-study - independant study activity (ISA)

Konstantin Filonenko
21/02/2019 → 16/08/2019

Supervision

Achieving the goal of a self-sufficient Ærø, utilizing storage.

, Konstantin Filonenko & Christian Veje
03/02/2020 → ...

Advances in modeling of district heating systems for supply temperature optimization

Konstantin Filonenko
01/02/2019 → 30/07/2019

En undersøgelse af brug af hybridvarmepumper i mindre virksomheder og offentlige institutioner i Vejle Nord i stedet for den nuværende varmekilde gas

Konstantin Filonenko
02/09/2019 → 29/01/2020

First steps of a simulation model for Thermonet

Christian Veje & Konstantin Filonenko
01/02/2018 → 01/06/2018

Heat pumps and excess heat

Konstantin Filonenko
03/09/2018 → 29/01/2019

Modeling of DH grid for Smart energipuljen in Vejle Nord LiveLab (40 ECTS)

Konstantin Filonenko
02/09/2019 → ...

Modeling the future distributed electricity grid

Konstantin Filonenko
01/02/2019 → 27/06/2019

Optimization of dimensioning method for district heating pipes

Konstantin Filonenko
01/02/2019 → 15/06/2019

Optimizing the Thermal Energy Storage Configuration

Konstantin Filonenko
01/02/2019 → 15/06/2019

Optimizing the Thermal Energy Storage Configuration of Fynsværket

Christian Veje & Konstantin Filonenko
01/02/2019 → 31/05/2019

PV-panels installed on flat roofs integrated with an electricity storing battery unit

Konstantin Filonenko
02/09/2019 → ...

Reaching a sustainable solution for Aeroe's heat production and consumption

, Konstantin Filonenko & Christian Veje
01/02/2020 → ...

Educational practice - Basis/values

The students I train may be at different levels of knowledge, that is why I try to hold most of the lectures at the level which every student can comprehend. Additionally, I challenge my students to go deeper in homework problems, making sure that I am available for help any time they have concerns. I listen and understand the challenges of my students and learn from their feedback. A critical aspect of my learning style is the provision of high-quality lectures. To accomplish this, I concentrate on the theoretical background and step-by-step problem-solving. I pay attention to the main topic in perspective at different levels: for the course itself, for engineering, for broader purposes and, most importantly, for actual semester projects and future research. Detailed explanations and demonstrations in the classroom help students to see different approaches to solving problems they may not have used. I want my students to analyze these problems because they will need to use similar strategies for problem solving in future.

The nature of the topics I have been teaching requires students to learn tools they can apply in a wide range of engineering problems. My objective as a teacher is to motivate the students to synthesize and extrapolate the knowledge, they have acquired previously to problems they have never seen. The desired teaching process may include the following steps:

1. Trial and error: students are offered to solve a problem using their previous background
2. Exposure: students are shown a solution to the problem, which includes an element of novelty, a piece of knowledge lacking in their background, which they can read up on in the supplementary material
3. Acquaintance: students solve a problem, which includes the same element in the same circumstances to practice their new understanding
4. Extrapolation: students solve a problem, which includes the analogous element in the same circumstances or the same element in different circumstances
5. Synthesis: skills obtained through 3 and 4 are aggregated and applied to small research problems

The software evolves faster than technology, therefore, I try to teach my students the most useful subset of skills I use myself in relation to my current research (e.g. application of grey-box modeling and machine learning to small systems and datasets) to keep them up to date with the current state of equation-based modeling and data science.

Finally, I devote part of each lecture to problem-based learning, in which my students work independently, in groups, rather than just watching me do the examples on the blackboard. Lecture usually ends with the repetition of essential aspects of previous homework. I actively use online software to improve the level of homework assignments and student practical skills, e.g. while lecturing in MPRG I used MathWorks online framework Cody Coursework, which was largely appreciated by my students. Experience, time spent in the class, and feedback from my students and colleagues help me improve my teaching skills. I enjoy the opportunities that I have, and hopefully, my students indeed learned a lot about physics, mathematics and programming becoming involved explorers in their journey into engineering.

Formal pedagogical training

Introduction to University Pedagogy
Konstantin Filonenko (Participant)
2015

Publications

Optimization of district heating production with thermal storage using mixed-integer nonlinear programming with a new initialization approach

Bjørnskov, J., Mortensen, L. K., Filonenko, K., Shaker, H. R., Jradi, M. & Veje, C., 24. Sep 2021, In: *Energy Informatics*. 4, Suppl. 2, 34.

Flexible Block Offers and A Three-stage Market Clearing Method for Distribution-level Electricity Markets with Grid Limits

Huang, S., Zhao, Y., Filonenko, K., Wang, Y., Xiong, T. & Veje, C. T., Sep 2021, In: *International Journal of Electrical Power & Energy Systems*. 130, 106985.

Formulation and implementation of a model predictive control (MPC) strategy for a PCM-driven building ventilation cooling system

Yang, T., Filonenko, K., Dallaire, J., Ljungdahl, V. B., Jradi, M., Kieseritzky, E., Pawelz, F. & Veje, C., 2021, *BS 2021 Proceedings*.

Indoor Climate Modelling and Optimal Planning With Respect To Electricity Prices

Huang, S., Filonenko, K., Zhao, Y., Yang, T., Xiong, T. & Veje, C., 2021, (Accepted/In press) *IEEE PES General Meeting*. IEEE

Implementation and performance analysis of a multi-energy building emulator

Yang, T., Filonenko, K., Arendt, K. & Veje, C., 29. Oct 2020, *2020 6th IEEE International Energy Conference (ENERGYCon)*. IEEE, p. 451-456

Modelica implementation of phase change material ventilation unit

Filonenko, K., Ljungdahl, V. B., Yang, T. & Veje, C., 29. Oct 2020, *2020 6th IEEE International Energy Conference (ENERGYCon)*. IEEE, p. 464-467

Methodology for Evaluation of District Heating Network Efficiency

Howard, D. A., Filonenko, K., Busk, F. S. & Veje, C., 24. Aug 2020, In: *E3S Web of Conferences*. 186, 9 p., 01006.

Modeling and Simulation of a Heating Mini-Grid for a Block of Buildings

Filonenko, K., Arendt, K., Jradi, M., Andersen, S. & Veje, C., 2020, *Proceedings of Building Simulation 2019: 16th Conference of*. Corrado, V., Fabrizio, E., Gasparella, A. & Patuzzi, F. (eds.). International Building Performance Simulation Association, Vol. 16. p. 1971-1978 (Proceedings of the International Building Performance Simulation Association, Vol. 16).

Modeling future heat pump integration in a power radial

Filonenko, K., Copeland, M., Jespersen, K. & Veje, C., 2020, *Proceedings of the American Modelica Conference 2020, Boulder, Colorado, USA, March 23-25, 2020: Linköping Electronic Conference Proceedings*. Tiller, M., Tummescheit, H., Vanfretti, L., Laughman, C. & Wetter, M. (eds.). Modelica Association and Linköping University Electronic Press, Vol. 169. p. 130-138 (Linköping Electronic Conference Proceedings).

Numerical Simulation of a Magnetocaloric Heat Pump for Domestic Hot Water Production in Residential Buildings

Johra, H., Filonenko, K., Marszal-Pomianowska, A. J., Heiselberg, P. K., Veje, C., Dall'Olio, S., Engelbrecht, K. & Bahl, C. R. H., 2020, *Proceedings of Building Simulation 2019: 16th Conference of IBPSA*. Corrado, V., Fabrizio, E., Gasparella, A. & Patuzzi, F. (eds.). International Building Performance Simulation Association, (Proceedings of the International Building Performance Simulation Association).

Object-oriented modeling and performance evaluation of a PCM-based ventilation system

Yang, T., Ljungdahl, V. B., Jradi, M., Filonenko, K., Kieseritzky, E., Pawelz, F. & Veje, C., 2020, *33rd International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2020)*. Yokoyama, R. & Amano, Y. (eds.). ECOS, Vol. 1. p. 1584-1594

Towards a 100% renewable island power system with energy storage: modelling, optimization, and cost analysis
Huang, S., Limousin, E., Filonenko, K. & Veje, C., 2020, *33rd International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2020)*. Yokoyama, R. & Amano, Y. (eds.). ECOS, Vol. 1. p. 308-319

Verification of multi-energy system components for renewable integration
Filonenko, K., Gammelgaard, E., Hansen, D., Buck, J. & Veje, C., 2020, *2020 6th IEEE International Energy Conference (ENERGYCon)*. IEEE, p. 290-295

Integration of a magnetocaloric heat pump in an energy flexible residential building
Johra, H., Filonenko, K., Heiselberg, P., Veje, C., Dall'Olio, S., Engelbrecht, K. & Bahl, C., Jun 2019, In: *Renewable Energy*. 136, p. 115-126

A Review of the Convexification Methods for AC Optimal Power Flow
Huang, S., Filonenko, K. & Veje, C., 2019, *2019 IEEE Electrical Power and Energy Conference (EPEC)*. IEEE, 6 p.

Cascading implementation of a magnetocaloric heat pump for building space heating applications
Johra, H., Filonenko, K., Heiselberg, P. K., Dall'Olio, S., Engelbrecht, K. & Bahl, C. R. H., 2019.

Comparison of two simulation tools for district heating applications
Filonenko, K., Howard, D. A., Buck, J. & Veje, C., 2019, *Proceedings of the 9th International Energy Conference REMOO*. 10 p.

Modeling of thermal district heating network with common sources and decentralized heat production
Filonenko, K., Arendt, K. & Veje, C., 2019, *Proceedings of the 9th International Energy Conference REMOO*. 10 p. 02.013

Teaching electrical system modelling with applications in energy systems
Filonenko, K. & Veje, C., 2019.

Bio-inspired design and movement generation of dung beetle-like legs
Ignasov, J., Kapilavai, A., Filonenko, K., Larsen, J. C., Baird, E., Hallam, J., Büsse, S., Kovalev, A., Gorb, S. N., Duggen, L. & Manoonpong, P., 1. Dec 2018, In: *Artificial Life and Robotics*. 23, p. 555-563 9 p.

Integration of a magnetocaloric heat pump in a low-energy residential building
Johra, H., Filonenko, K., Heiselberg, P. K., Veje, C., Lei, T., Dallolio, S., Engelbrecht, K. & Bahl, C., Aug 2018, In: *Building Simulation*. 11, 4, p. 753-763

Active magnetic regenerators implemented as a magnetocaloric heat pump for residential buildings
Johra, H., Filonenko, K., Heiselberg, P. K., Veje, C., Dallolio, S., Engelbrecht, K. & Bahl, C. R. H., 2018, *8th International Conference on Caloric Cooling (Thermag VIII). Proceedings*. International Institute of Refrigeration, p. 21-26 0002. (Thermag = IIR Conference on Magnetic Refrigeration at Room Temperature, Vol. 8).

Simulation of a magnetocaloric heating network
Filonenko, K., Johra, H., Dallolio, S., Engelbrecht, K., Heiselberg, P. K., Bahl, C. R. H. & Veje, C., 2018, *8th International Conference on Caloric Cooling (Thermag VIII). Proceedings*. International Institute of Refrigeration, p. 15-20 0001. (Thermag = IIR Conference on Magnetic Refrigeration at Room Temperature, Vol. 8).

Numerical routine for magnetic heat pump cascading
Filonenko, K., Lei, T., Engelbrecht, K., Bahl, C. & Veje, C., 2. Oct 2017. 1 p.

Bio-Inspired Design and Kinematic Analysis of Dung Beetle-Like Legs
Aditya, S. K. V., Ignasov, J., Filonenko, K., Larsen, J. C., Baird, E., Hallam, J., Büsse, S., Kovalev, A., Gorb, S., Duggen, L. & Manoonpong, P., 2017.

Plasmon Modes of Vertically Aligned Superlattices

Filonenko, K., Duggen, L. & Willatzen, M., 2017, *Proceedings of the 2017 Spring Symposium on Progress In Electromagnetics Research Symposium*. IEEE, p. 2852-2857

A Cascading Model of An Active Magnetic Regenerator System

Tahavori, M., Filonenko, K., Veje, C., Lei, T., Engelbrecht, K. & Bahl, C., 2016, *Proceedings of the 7th International Conference on Magnetic Refrigeration at Room Temperature*. International Institute of Refrigeration, p. 248-251 4 p. (Science et Technique du Froid).

Hybrid Surface Plasmon Polariton Modes of Subwavelength Nanowire Resonators

Filonenko, K., Duggen, L. & Willatzen, M., 2015.

Mathematical modeling of the Purcell effect in plasmonic nanostructures

Filonenko, K., 2015, Syddansk Universitet. Det Tekniske Fakultet.

Purcell effect of asymmetric dipole source distributions in nanowire resonators

Filonenko, K., Duggen, L., Adam, J. & Willatzen, M., 2015. 1 p.

Purcell effect at silver nanowires and nanorings

Filonenko, K. & Bordo, V., Dec 2014, *Proceedings of the 3rd Advanced Electromagnetics Symposium*. Zouhdi, S., Sun, L. & Wu, K. (eds.). 3 p. 249

Purcell effect for finite-length metal-coated and metal nanowires

Filonenko, K., Willatzen, M. & Bordo, V., Aug 2014, In: *Journal of the Optical Society of America B: Optical Physics*. 31, 8, p. 2002-2011 10 p.

Spontaneous Emission Enhancement at Finite-length Metal Nanowires

Filonenko, K., Willatzen, M. & Bordo, V., 2013, In: *Progress in Electromagnetics Research Symposium*. p. 1305-1309