

AMPERE 2023: Modeling Workshop



Marzena Olszewska-Placha and Vadim V. Yakovlev, Organizers

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Cardiff University
Center for Student Life
Cardiff, Wales, U.K.

Synopsis

The workshop aims to introduce the attendees to the basic concepts, techniques, and practices of computer modelling for microwave power systems and processes. The event will feature two lectures explaining the fundamentals of the Finite Element Method and the Finite Difference Time Domain Technique and principles of their use in *COMSOL Multiphysics*[®] and *QuickWave*[™], respectively. The introductory lectures will be followed by presentations of corresponding case studies, with examples of successful modelling projects, including problem formulations, solutions, and interpretation of results. The workshop will also feature two (optional) hands-on sessions in which participants will get their initial experience with step-by-step modelling processes in both *COMSOL Multiphysics*[®] and *QuickWave*[™].

Program & Schedule

8:00 – 8:10 *Opening Remarks*
 Vadim V. Yakovlev
 Worcester Polytechnic Institute, Worcester, MA, USA

FEM Approach – *COMSOL Multiphysics*[®]

8:10 – 8:50 *Introduction to COMSOL Multiphysics*[®]
 Neena Banlawe, Taylor Boyd
 COMSOL Ltd., Cambridge, U.K.

8:50 – 9:00 ***Break***

9:00 – 9:30 *Case study I: Modeling of electromagnetic waves interaction with food and packages*
 Sohan Birla
 ConAgra Brands, Elkhorn, NE, USA

9:30 – 10:00 *Case study II: The use of multi-physics numerical simulation to generate materials processing maps*
 Paolo Veronesi
 University of Modena and Reggio Emilia, Modena, Italy

10:00 – 10:20

Break

10:20 – 11:50

Modelling microwave processes in COMSOL Multiphysics® – hands-on practical session

Taylor Boyd
COMSOL Ltd., Cambridge, U.K.

11:50 – 13:10

Lunch

FDTD Approach – QuickWave™

13:10 – 13:50

Introduction to the QuickWave™ software: electromagnetic and multiphysics modelling

Marzena Olszewska-Placha
QWED, Warsaw, Poland

13:50 – 14:00

Break

14:00 – 14:30

Case study I: Coupled electromagnetic and heat transfer modelling in a microwave cavity for thermal analysis of materials

José M. Catalá Civera
Polytechnic University of Valencia, Valencia, Spain

14:30 – 15:00

Case study II: Simulation of temperature fields in microwave-assisted production of SiC_f/SiC composites

Vadim V. Yakovlev
Worcester Polytechnic Institute, Worcester, MA, USA

15:00 – 15:20

Break

15:20 – 16:50

QuickWave™ – hands-on practical session

Marzena Olszewska-Placha
QWED, Warsaw, Poland
Vadim V. Yakovlev
Worcester Polytechnic Institute, Worcester, MA, USA

Concluding Session

16:50 – 17:00

COMSOL Multiphysics® & QuickWave™ – Q&A

17:00 – 17:10

General Discussion