

# IMPI 56: Modeling Workshop

Marzena Olszewska-Placha and Vadim V. Yakovlev, Organizers

June 14, 2022

The DeSoto Hotel  
Savannah, GA, USA



## Synopsys

The Workshop aims to introduce the attendees to the basic concepts, techniques and practices of computer modeling for microwave power systems and processes. The event will consist of a series of talks explaining the fundamentals of the Finite Element Method (FEM) and the Finite-Difference Time-Domain (FDTD) Technique and principles of their use in the *COMSOL Multiphysics* and *QuickWave* computational environments, respectively. Introductory Lectures about each approach will be followed by discussions of corresponding Case Studies, i.e., examples of successful modeling projects that include formulation of a problem, its solution and interpretation of the results. The Workshop will also feature a presentation of a step-by-step modeling process implemented in *QuickWave*.

## Program & Schedule

- 7:30 – 8:00 am      ***Continental Breakfast***
- 7:55 – 8:00 am      ***IMPI 56 / Workshop Orientation***  
Molly Poisant  
IMPI
- 8:00 – 8:10 am      ***Introduction & Opening Remarks***  
Vadim Yakovlev  
Worcester Polytechnic Institute, MA, USA

### FEM Approach – *COMSOL Multiphysics*

- 8:10 – 8:50 am      ***Introduction to COMSOL Multiphysics: Electromagnetics, Heat Transfer, and Beyond***  
Ajit Mohekar  
Worcester Polytechnic Institute, MA, USA
- 8:50 – 9:20 am      ***Modeling of Microwave Interaction with Food and Packages in Domestic Microwave Oven***  
Sohan Birla  
ConAgra Brands, Elkhorn, NE, USA

9:20 – 9:50 am      ***Electromagnetic-Thermal-Mechanical Simulation of Microwave Sintering Applications: a Focus Flash Sintering***  
Charles Manière  
University of Normandy, Caen, France

9:50 – 10:05 am      ***Coffee Break***

**FDTD Approach – QuickWave**

10:05 – 10:55 am      ***Introduction to the QuickWave Software: Electromagnetic and Multiphysics Modelling***  
Marzena Olszewska-Placha  
QWED, Warsaw, Poland

10:55 – 11:25 am      ***QuickWave Multiphysics Models of Metallurgical Reactions***  
Paolo Veronesi  
University of Modena and Reggio Emilia, Modena, Italy

11:25 – 11:55 am      ***Simulation of Temperature Fields in Microwave-Assisted Production of SiC<sub>f</sub>/SiC Composites***  
Vadim Yakovlev  
Worcester Polytechnic Institute, MA, USA

11:55 – 1:30 pm      ***Lunch***

**Modeling with QuickWave – Nuts & Bolts**

1:30 – 1:45 pm      ***Modeling Project: Basics & Principles***  
Vadim Yakovlev  
Worcester Polytechnic Institute, MA, USA

1:45 – 3:15 pm      ***Model Development and Simulation: QuickWave-Modeler-Based Process***  
Marzena Olszewska-Placha  
QWED, Warsaw, Poland

3:15 – 3:30 pm      ***Discussion & Conclusion***