

Modeling Phased Array Radar Systems

We will review techniques to simulate phased array radar systems by building up a scalable model and demonstrating simulation results for each radar component. We will use these components to build up an end-to-end radar system. The tutorial will also cover techniques to model RF components and complex antenna structures to add greater levels of fidelity to system models. We will show how data collected from radar system hardware compares to the model we build up during the tutorial.

The outline for the session is here:

1. Introduction and motivation for phased array radar system modelling
2. Review of phased array radar fundamentals and simulation system architecture
3. Design and analyze complex transmit and receive arrays
4. Model & simulate each radar system component
5. Increase the level of the model fidelity
6. Integrate signal processing, data processing, and control (beamforming, matched filtering, tracking, etc.)
7. Conclusion including comparisons to radar hardware evaluation boards

Honglei Chen is a principal engineer at MathWorks where he leads the development of phased-array system simulation tools and algorithms for radar, 5G, sonar, and ultrasound applications. Prior to his current role, Honglei also developed tools and algorithms focused on signal processing systems. Honglei received his Bachelor of Science from Beijing Institute of Technology and his MS and PhD, both in electrical engineering, from the University of Massachusetts Dartmouth.

Rick Gentile focuses on Phased Array, Signal Processing, and Sensor Fusion applications at MathWorks. Prior to joining MathWorks, Rick was a Radar Systems Engineer at MITRE and MIT Lincoln Laboratory, where he worked on the development of many large radar systems. Rick also was a DSP Applications Engineer at Analog Devices where he led embedded processor and system level architecture definitions for high performance signal processing systems, including automotive driver assist systems. Rick co-authored the text "Embedded Media Processing". He received a B.S. in Electrical and Computer Engineering from the University of Massachusetts, Amherst and an M.S. in Electrical and Computer Engineering from Northeastern University, where his focus areas of study included Microwave Engineering, Communications and Signal Processing.