Microwave and Millimeter Wave Imaging in Real Time

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Abstract:
Real-time microwave and millimeter-wave (MMW) imaging methods are the workhorse in applications ranging from synthetic aperture radar, which operates with far-field data, to nondestructive testing and medical imaging, which employ near-field measurements. The last decade has witnessed a dramatic decrease in the price and size of MMW electronics, the advent of on-chip radars, and the emergence of sub-THz electronics. This spurred unprecedented growth in MMW imaging and sensing, a technology that allows for "seeing" through optically opaque barriers and which is at the frontier of wireless research and development. We will categorize, compare, and contrast the fast (real-time) imaging methods and algorithms, taking into account the employed radar architectures and the limitations stemming from assumptions in the underlying mathematical models of scattering.

Bio:
Professor Natalia K. Nikolova is a Professor in the Department of Electrical and Computer Engineering at McMaster University, Canada. Her research interests include inverse scattering, microwave and millimeter-wave imaging, as well as computer-aided analysis and design of high-frequency structures and antennas. Prof. Nikolova has authored more than 310 refereed manuscripts, 7 book chapters, and 2 books, including the monograph "Introduction to Microwave Imaging" (2017). She has delivered 58 invited lectures, webinars, and short courses internationally on the subjects of microwave imaging and computer-aided electromagnetic analysis and design. She is a Fellow of the IEEE, the Canadian Academy of Engineering, and the Engineering Institute of Canada.