Novel Methodologies for EM Computation and Design with Applications in Communication, Medicine, and Meteorology: In Memory of W. Ross Stone

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RF, antennas, microwave, radar, microelectronics, wireless, and lightwave technologies are exploding! The importance of electromagnetic theory, computation, and design to these technologies can hardly be overstated. This talk presents several novel methodologies and computational technologies for RF and electromagnetic analysis and design including uncertainty quantification, error control, and adaptive refinement, which are essential for modern effective and reliable simulation-based design in mission-critical RF and microwave applications. Our novel approaches constituted by accelerated, rigorous, adaptive, goal-oriented error estimation and control, sensitivity and uncertainty quantification, and model refinement for RF and microwaves and engineering in general show unparalleled accuracy, efficiency, robustness, and versatility of analyses and simulations.

The talk also presents several advanced electromagnetic applications combining RF and microwave concepts, techniques, and technologies with emerging interdisciplinary topics, to solve general real-world problems with impacts on wireless communication, medicine, and meteorology. The applications include characterization of wireless propagation and radio channel modeling in outdoor urban scenarios, antenna design for medical imaging and diagnostics, and remote sensing of winter precipitation.

This talk is memory of W. Ross Stone, who made lasting contributions to electromagnetics, antennas and propagation, and radio science community and profession. He was an IEEE Fellow for "Contributions to the fields of inverse problems and computational electromagnetics," and had great interest and results in electromagnetic scattering and propagation and optical propagation and measurements. While presenting some novel methodologies for electromagnetic computation and design with applications in communication, medicine, and radar meteorology, this talk will specially emphasize the topics researched and advanced by Ross Stone.

Ross was a living library and archive, and a go-to colleague and friend. He was a resource not only to his fellow AP-S and URSI volunteers but also to IEEE staff and officials. "Let's ask Ross" was a last resort when the other sources of information failed. His responsiveness, promptness, and resourcefulness were unmatched indeed. Our professional community, most notably, AP-S and URSI, was his extended family, truly and literally. He not only worked but lived for this family, for many decades, every day, until the last one. Ross will be deeply and dearly missed, as a colleague, visionary, and friend.