

---

**DOUGLAS KURRANT**, University of Calgary

*Microwave breast imaging using patient specific prior information*

Microwave (MW) imaging has been proposed as a complementary method for breast imaging as it is sensitive to the electrical properties of tissues. Radar-based imaging and microwave tomography (MWT) exploit imaging at microwave frequencies. Radar-based imaging uses ultra wideband (UWB) pulses to illuminate the breast and information is extracted from backscattered fields to imply the location of strong scatterers (e.g., tumor). MWT measures the scattered field arising when the breast is illuminated with single frequency time-harmonic waveforms. Iterative methods are applied to the data to solve an inverse scattering problem and reconstruct the spatial distributions of the dielectric properties. High resolution MWT methods use a large number of reconstruction elements to capture details related to spatially fine features within the interior. For typical MW measurement systems, the number of reconstruction elements far exceeds the number of independent data, leading to non-unique solutions. This contributes to the ill-posedness of the problem and manifest as convergence to local minima. Incorporating prior information related to the electrical properties and anatomical structures of the imaged region into MWT inversion algorithms helps to mitigate the problem of ill-posedness. We present a combined radar/MWT method developed for monitoring tumor size changes to assess treatment progress. Radar methods acquire the breast's basic structural information that is used as prior patient specific information for the high resolution MWT algorithm. This basic prior information significantly improves the quality of the reconstructed images. Joint work with Anastasia Baran (Manitoba), Elise Fear (Calgary), and Joe LoVetri (Manitoba).