RLE
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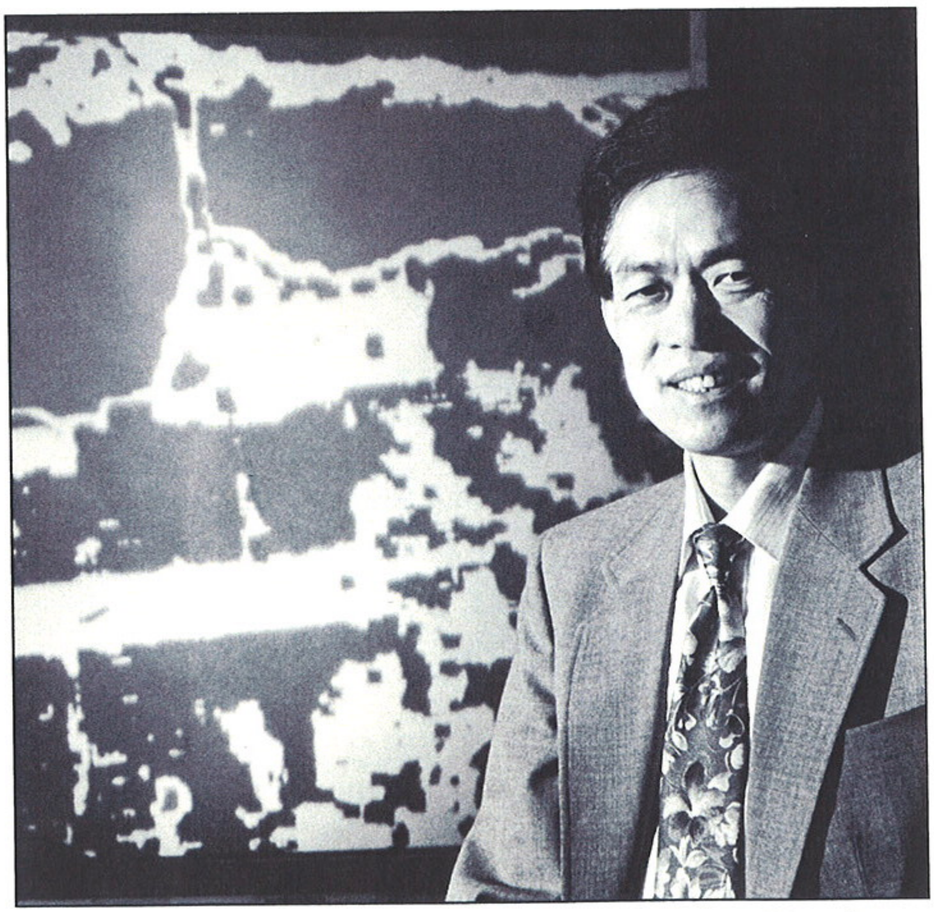
The Research Laboratory of Electronics at the Massachusetts Institute of Technology

MAKING WAVES: Electromagnetics Research at RLE



Professor Jin Au Kong's work in microwave remote sensing has produced this polarimetric synthetic aperture radar (SAR) image of the San Francisco Bay area. The image is categorized into three terrain types: ocean, park, and urban areas.
(Photo by John F. Cook)

It wasn't until 1873 that Scottish physicist James Clerk Maxwell formulated an unprecedented set of mathematical equations to coherently describe the interrelationship of electric and magnetic fields. For centuries, people had witnessed the invisible force fields of various electrical and magnetic phenomena, such as the static electricity generated when rubbing a piece of amber. In an attempt to explain these various phenomena, scientists used terms such as "fluid" or "current" to describe the seemingly unrelated forces of electricity, heat, light, and magnetism. A powerful influence that precipitated the connection of electricity and magnetism came in the early 1800s. *Naturphilosophie*, a school of thought which had its origins in Germany, postulated that nature was engaged in an ongoing struggle, that all progress resulted from synthesis (which itself was a product of opposing forces), and that everything in nature was related to everything else.

Danish physicist Hans Christian Oersted, an advocate of Naturphilosophie, first demonstrated that moving electrical charges (or currents) exhibit magnetic effects and can produce a magnetic field. During a lecture in 1820, while connecting a battery to a circuit, he coincidentally observed that a nearby compass' needle was deflected as though the battery's electric current

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