

*Department of Electronic Engineering  
State Key Laboratory and  
IEEE AP/MTT HK Joint Chapter  
Jointly Present a Postgraduate Research Seminar  
On*

**Solution To The General Helmholtz Equation  
Starting From Laplace's Equation**

By

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Date : 1 April 2011 (Friday)  
Time : 2:30pm – 3:30pm  
Venue : **Lecture Theatre 11**, 4/Floor, Academic Building, City University of Hong Kong

**Abstract**

In this presentation we illustrate how to solve the general Helmholtz equation starting from Laplace's equation. The goal is to illustrate that one obtain the solution of the dynamic problem starting from the static solution! The interesting point is that the Helmholtz equation has a frequency term where as the Laplace's equation is the static

solution of the same boundary value problem. In this new formulation the frequency dependence is manifested in the form of an excitation. A new boundary integral method for solving the general Helmholtz equation is developed. This new formulation is developed for the two-dimensional Helmholtz equation. The new formulation is based on the method of moments Laplacian solution. The main feature of this new formulation is that the boundary conditions are satisfied independent of the region node discretizations. The numerical solution of the present method is compared with finite difference and finite element solutions of the same problem. Application of this method is also presented for the computation of cut-off frequencies for some canonical waveguide structures.

### **Brief Biography**

Tapan K. Sarkar received the B.Tech. degree from the Indian Institute of Technology, Kharagpur, in 1969, the M.Sc.E. degree from the University of New Brunswick, Fredericton, NB, Canada, in 1971, and the M.S. and Ph.D. degrees from Syracuse University, Syracuse, NY, in 1975. He is now a Professor in the Department of Electrical and Computer Engineering, Syracuse University. His current research interests deal with numerical solutions of operator equations arising in electromagnetics and signal processing with application to system design. He obtained one of the “best solution” awards in May 1977 at the Rome Air Development Center (RADC) Spectral Estimation Workshop. He received the Best Paper Award of the IEEE Transactions on Electromagnetic Compatibility in 1979 and in the 1997 National Radar Conference. He has authored or coauthored more than 300 journal articles and numerous conference papers and 32 chapters in books and 15 books.

He received Docteur Honoris Causa both from Universite Blaise Pascal, Clermont Ferrand, France in 1998 and from Politechnic University of Madrid, Madrid, Spain in 2004. He received the medal of the friend of the city of Clermont Ferrand, France, in 2000.

**\*\* All are welcome \*\***