

# **Art of Mixing and Hybridization in Engineering**

## **by Prof Wu Ke**

### **Abstract**

The great success of many scientific discoveries and technological innovations can be attributed to multidisciplinary and cross-field research and development. In fact, quite a large number of those academic and industrial adventures are based on unique ingenious and organic features, mechanisms, or characteristics (usually complementary) of two or more different existing methods, whether mathematically, physically, chemically, or conceptually combined. In the long history of engineering development, the art of mixing and hybridization can be seen everywhere. It has become the source of inspiration for endless creations and innovations. In this presentation, we will discuss and demonstrate the most recent examples of mixing and hybridization in the field of radiofrequency (RF), microwave electronics, and applied electromagnetics. These examples range from theoretical approaches, design techniques, technological platforms and device developments to system architectures. In particular, our distinct three achievements will be highlighted, including the substrate integration platform of planar and non-planar structures, the simultaneous electric- and magnetic tuning scheme for flexible frequency agility, and the hybrid architecture of radio and radar systems within single transceiver. Such successful and interesting mixing and hybridization examples suggest that future discoveries, creations and innovations in engineering require certain “marriage” among different domains.

### **Biography**

Dr Ke Wu is Professor of electrical engineering, and Canada Research Chair in RF and millimeter-wave engineering at the Ecole Polytechnique (University of Montreal). He has been the Director of the Poly-Grames Research Center and the Founding Director (2008-2014) of the Center for Radiofrequency Electronics Research of Quebec. He has authored/co-authored over 990 referred papers, and a number of books/book chapters and more than 30 patents. Dr Wu has held key positions in and has served on various panels and international committees including the chair of technical program committees, international steering committees and international conferences/symposia. In particular, he was the general chair of the 2012 IEEE MTT-S International Microwave Symposium. He has served on the editorial/review boards of many technical journals, transactions and letters as well as scientific encyclopedia including editors and guest editors. He has been providing consulting services to corporations, governments and universities around the world. Dr Wu is an elected IEEE MTT-S AdCom member and has served as the chair of many standing committees including Transnational Committee, Member and Geographic Activities (MGA) Committee and Technical Coordinating Committee (TCC). He also serves as the inaugural North-American representative in the General Assembly of the European Microwave Association (EuMA). He was the recipient of many awards and prizes including the inaugural IEEE MTT-S Outstanding

Young Engineer Award, the 2004 Fessenden Medal of the IEEE Canada, the 2009 Thomas W. Eadie Medal from the Royal Society of Canada (The Academies of Arts, Humanities and Sciences of Canada), the Queen Elizabeth II Diamond Jubilee Medal, the 2013 Award of Merit of Federation of Chinese Canadian Professionals and the 2014 IEEE MTT-S Microwave Application Award. He is a Fellow of the IEEE, a Fellow of the Canadian Academy of Engineering (CAE) and a Fellow of the Royal Society of Canada. He was an IEEE MTT-S Distinguished Microwave Lecturer from Jan. 2009 to Dec. 2011.