



Title: Power Control in Wireless Communication Networks via Estimation of Signal Interference and Optimization of Signal to Interference Ratio

Speaker: Dr. Zoran Gajic, Rutgers University, New Brunswick, NJ.

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Abstract: Signal power is one of the most important commodities in signal transmission over communication channels. During the last ten years, the problem of efficient mobile power control in wireless communication networks has become a central research problem that has resulted in several hundred journal and conference papers. It has recently attracted broad interest from experienced control engineering researchers. For high quality of signal transmission a high signal power to interference power ratio is required; but in wireless channels, increasing the signal power of one mobile increases interference to other mobiles using the same communication channel (co-channel users). Even more, high mobile powers drain mobile batteries quickly and require frequent battery recharging. The search for efficient mobile power distribution schemes leads to several interesting estimation- and optimization-type control problems. In this talk, we present techniques for optimal power control based in wireless communication networks based on estimation of interference (and the quantity called the channel variation). The interference is estimated using the H-infinity filter, however, any estimator can be used for such a purpose. In addition, an optimal performance criterion is minimized in the sense that the desired signal to interference ratio is as close as possible to its target value for all users. Both user-centric and network-centric objectives are met under the considered problem formulation. The results are also presented for the corresponding stochastic power control problem under Gaussian white noise assumption, in which case the Kalman filter is used and the signal variance minimized. These considered algorithms are distributive in nature requiring only local information.

Biography: Zoran Gajic is a Professor of Electrical and Computer Engineering at Rutgers University. He has been teaching electrical circuits, linear systems and signals, controls, and networking courses at the same school since 1984. Dr. Gajic has been serving since 2003 as the Graduate ECE Program Director. His research interests are in controls systems, wireless communications, and networking. He is the author or coauthor of more than seventy journal papers, primarily published in *IEEE Transactions on Automatic Control* and *IFAC Automatica* journals, and seven books published by *Academic Press*, *Prentice Hall*, *Marcel Dekker*, and *Springer Verlag*. His textbook *Linear Dynamic Systems and Signals*, Prentice Hall, 2003 has been translated into the Chinese Simplified language. His book on *Lyapunov Equation in Systems Stability and Control*, originally published by the Academic Press in 1995, will be republished by Dover Publications in 2008. Professor Gajic has delivered three plenary lectures at international conferences and presented more than one hundred conference papers, and served on the editorial board for several journals. Zoran Gajic received Dipl. Ing. (5 year program) and Mgr. Sci. (2 year program) degrees in Electrical Engineering from the University of Belgrade, and an M.S. degree in Applied Mathematics and Ph.D. in Systems Science Engineering from Michigan State University in 1984.

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