

A Wideband MIMO Vehicle-to-Vehicle Channel Model in T-Junction Scattering Environments

FU Qin *, CHEN Wei **

* *School of Information Engineering, Wuhan University of Technology, Hubei, P.R. China*

** *School of Automation, Wuhan University of Technology, Hubei, P.R. China*

fuqin@whut.edu.cn, greatchen@whut.edu.cn

Abstract— In this paper, we model a wideband multi-input multi-output (MIMO) channel model for vehicle-to-vehicle (V2V) communications in T-junction street scattering environments. The proposed channel model takes into account both single- and double-bounce rays, and the exact relationship between angle of arrival (AOA) and angle of departure (AOD). Based on this relationship, the stochastic and the deterministic simulation model are derived. Analytical solutions are provided for the space-time cross-correlation function (ST-CCF), the temporal auto-correlation function (ACF), and the 2D space cross-correlation function (CCF). Finally, simulation results show the excellent correspondence between the temporal and the space correlation properties of the channel simulator and the reference model. This research work can be used for the derivation of wideband V2V channel simulators. Furthermore, the proposed model lays a foundation for further studies of V2V communication systems.

Keywords—channel model, frequency non-selective, MIMO, RSM, V2V



Fu Qin received the master's degree in communication and information system from Huzhong University Science and Technology, Wuhan, China, in 2003. She also received the doctor's degree in communication and information system from Wuhan University of Technology, Wuhan, China, in 2011. From 2003 to 2012, she worked as a lecture of digital communication at the School of Information Engineering in Wuhan University of Technology, China. Since October 2012, she has been an associate professor of Wuhan University of Technology, China. She has seven papers published within recent 4 years. Her current research interests include mobile sensor node localization in WSN and Mobile-to-Mobile fading channel modeling.