

# Large MIMO Channel Estimation Study Based on Independent Component Analysis

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**Abstract**—MIMO systems, which consist of multiple transmitting and receiving antennas, are used as a method for effective use of frequency bandwidth. In general, signal separation in MIMO requires a known channel matrix. However, using Independent Components Analysis, signal separation is possible even when the channel matrix is unknown. On the other hand, if the channel matrix is known, MIMO technology may be efficiently utilized by precoding in the reverse direction line of TDD. In this study, we examined whether ICA can be used for signal separation and channel information estimation. We report that signal detection and channel estimation in large-scale MIMO can be performed without any problems.

**Keyword**—Large-scale MIMO, Channel Estimation, Independent Component Analysis, Blind Signal Separation



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**Tetsushi Ikegami** was born in 1957 in Tokyo, Japan, and is currently a professor at Meiji University in Japan. He received B. E., M. E. and Dr. E. degrees all in electrical engineering from Meiji University, Kawasaki, Japan in 1980, 1982, 1995, respectively. In 1985 he joined the Communications Research Laboratory, Ministry of Posts and Telecommunications, and undertook developments of mobile, fixed and inter satellite communication systems until 1997. From 1991 to 1992 he was a visiting scholar at the University of Illinois at Urbana-Champaign. Since 1997 he has been with the School of Science and Technology, Meiji University, where he is now a Professor at Department of Electronics and Bioinformatics. At present, he is a doctoral tutor, and has been engaged in scientific research and teaching in wireless mobile communication for a long time. His research direction and interest mainly focus on satellite communications, mobile communications, wideband systems, and UWB.