（様式 5）

学位（博士）論文要旨

(Doctoral thesis abstract)

論文提出者 (Ph.D. candidate)	工学府博士後期課程 Electronic and Information Engineering 専攻 （major） 　　2019 年度入学(Admission year) 学籍番号　　19834204 氏名　Doaa Abdelhameed Youssef Ahmed (student ID No.)　　　　(Name)
主指導教員氏名 (Name of supervisor)	Kenta Umebayashi
論 文 題 目 (Title)	1-Bit ADCs for Massive Antenna Communication Systems.

論文要旨（2000 字程度）
(Abstract(400 words))
※欧文・和文どちらでもよい。但し、和文の場合は英訳を付すこと。
（in English or in Japanese)

However attaching a massive number of antennas at the base station (BS) for the fifth generation (5G) communications and beyond acquires a great deal of attentiveness, but it comes at the expense of the practical implementation (e.g. power consumption, hardware cost). The low-resolution analog-to digital/digital-to-analog converters (ADCs/DACs) offer an auspicious settling for the practical impediments of the massive antenna systems. Employing the low-resolution ADC at the BS in the uplink can reduce the power consumption, hardware complexity, and cost. However, the systems with low-resolution ADCs (i.e., 1 to 3-bit ADCs) suffer from the nonlinearity and the performance degradation. In this thesis, we investigate a transmitter and receiver design for a single-user massive SIMO (single-input multiple-output) system with 1-bit ADCs at the base station (BS), where the user adopts higher-order modulation, e.g., 16-quadrature amplitude modulation (16-QAM), for the data transmission. For the channel estimation and the signal detection, the linear least-squares (LS) channel estimation and optimal maximum ratio combining (MRC) are employed, respectively. In this context, we first introduce closed-form formulas for the mean and covariance and/or correlation matrix of the estimated symbols by considering the effect of the 1-bit ADCs. The distribution of the estimated symbols is then accurately provided by taking into account the impact of the 1-bit ADCs. The analysis indicates that the conventional 16-QAM detector and the typical square 16-QAM constellation are not appropriate for the massive SIMO system with 1-bit ADCs. Then, we propose four different symbol detectors based on the statistical information of the estimated symbols. In addition, we re-design the transmitted constellation symbols

of the 16-QAM modulation for the massive SIMO system with 1-bit ADCs in order to improve the symbol error rate (SER). The upper bound on the symbol error rate (SER) is analyzed based on the pair-wise error probability.

（英訳）※和文要旨の場合(400 words)