over wireless channels.

Recently, the trend of wireless communication is changed from the conventional narrow-band voice service to the wide-band multimedia service. Therefore, it is highly required to develop the high-speed turbo decoder structure. An important problem in high-speed applications is decoding delay inherent to turbo decoding. Conventional Radix-2 MAP decoder has difficulty in applications of high-speed wireless communication mainly due to delay in interleaving/ deinterleaving and iterative decoding.

To solve the problem with latency of turbo decoder, in this thesis a Radix-4 MAP decoding algorithm and many parameters were adopted such as branch metric, forward/backward state metric, etc. Simulation results over AWGN channel show that the BER performance of the Radix-4 MAP turbo decoding is almost the same as that of Radix-2 MAP turbo decoding.

Radix-4 turbo MAP decoder was compared with the conventional one in terms of decoding speed. The decoding speed of the Radix-4 MAP turbo decoder is faster by 2.4 times at least than conventional one in the case of one iteration of turbo decoding.

67. 시스토릭 구조를 갖는 스마트 안테나 알고리즘 FPGA구현

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The performance of digital mobile radio communication systems is affected by channel fading and interference from co-channel users. The problems can be reduced by the use of array antenna at the base station with the appropriate signal processing and combining of the received signal. So it makes the study about smart antenna that tracks the beam according to the position of users, and improves the communication quality. The algorithm for smart antenna are the method based on Directions-of-Arrival(DOA) estimation, algorithm based on training signal, and Constant Modulus(CM) algorithm and so on. But these methods have weak points. First method must be heavy computational loads to detect the DOA and it should be assumed that the number of array antenna is more than that of interference signal. Second method used extra channel for training signal and it is difficult to make training signal when existing co-channel interference. Third method is difficult to choose the desired signal in case of receiving the signals having the constant amplitude more than one. But the drawback of the above mentioned methods has the difficulty demanding for the real time process because of the algorithm's complexity for implementing as hardware.

In this thesis, we design the smart antenna algorithm for real time processing which is based on QR-decomposition-based recursive least squares(QR-RLS) algorithm. The proposed algorithm for real time process consists of the systolic structure using Givens rotations to

calculate the inverse matrix which is necessary for many complexities. The number of bits which describes processing data is decided through the integer simulation. The performances of the proposed algorithm are evaluated via computer simulation in Rayleigh fading channel environment. And it is implemented as VHDL(VHSIC Hardware Description Language) to evaluate the real time processing.

68. 다중 음원 환경에서 수도형 거리추정 기법의 성능 개선에 관한 연구

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Line arrays are widely used in underwater acoustics to measure the spatial field of propagating acoustic waves and they have been investigated in the past to increase signal gain and improve angular resolution. Single-line receiver, however, requires a long horizontal aperture in order to achieve high signal gain and angular resolution; its performance may be substantially degraded by the reduced coherence lengths associated with bottom interaction in shallow water. And single-line receiver contains an ambiguity on conjugate bearings, because of lacking aperture in transverse direction. To solve the various limitations of single-line receiver the twin-line or multi-line array has been studied. Twin-line horizontal array is capable of resolving the left-right (port-starboard) bearing ambiguity inherent in single-line systems and providing high signal gain with a shorter aperture. So the drawback of twin-line array is to show lower angular resolution than single-line array, due to the short aperture size. Also, it has not been researched about array syntheses for twin-line.

In this thesis a synthetic aperture processing technique for twin-line array is proposed. The proposed method has improved SNR and extended the physical length of real line arrays by using successive measurements in space and time domain. It would be assumed that the each array moves along a straight-line course without acceleration and the received signals are coherent over the measured interval. The synthetic aperture method performs coherent processing of sub-aperture signals at successive time intervals in the beam domain via FFT transforms and is called FFT synthetic aperture (FFTSA). So the proposed method has the more improved angular resolution and the left-right bearing discrimination capability than the previous single-line or twin-line array.

Simulation results show the performance of the proposed method. To be real-time processing in real underwater environments, the proposed algorithms are implemented as DSP processor, TMS320C6711 made in Texas Instrument. The thesis presents the effectiveness of the proposed method from the implemented system. As a result, the average side lobe level