AVERAGE RATE AND BER EXPRESSIONS FOR M-QAM AMC WITH MULTIUSER DIVERSITY OVER NAKAGAMI-m FADING CHANNEL

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ABSTRACT

The demand for wireless communication services is tremendously increasing but available radio spectrum has a limitation. Hence the problem of maximizing spectral efficiency is one of the key issues in wireless communication techniques. Several diversity schemes such as spatial diversity and frequency diversity have developed to improve spectral efficiency.

Recently, another form of diversity was studied, called multiuser diversity inherent in a wireless network with multiple users ([2], [3], [7]). The strategy of multiuser diversity is similar to TDMA and assigns the channel to only one user who has the best channel condition. It is known that multiuser diversity is optimal channel assignment scheme in the sense of maximizing the throughput of a multiuser system ([2], [6]).

As one of the solution to the enhancement of spectral efficiency, adaptive modulation and coding (AMC) technique is used for the single user system. This technique can be applied to the multiuser system with multiuser diversity scheme since it can be treated as a single user model under such strategy.

In this talk, we study the performance of the finite M-QAM AMC with multiuser diversity technique over Nakagami-m fading channel. The Nakagami-m fading model was introduced by Nakagami in the early 1940's to characterize rapid fading in long distance HF channels ([5], p. 53). The Nakagami-m distribution is known to give the best fit to the land-mobile and the indoor-mobile multipath environment, as well as scintillating ionospheric radio links ([4], p. 23). Beyond such experimental excellence, Nakagami-m fading model is universal in the sense that it becomes the Rayleigh distribution when $m = 1$ and when $m > 1$ the Ricean fading can be closely approximated by Nakagami-m fading model. Moreover, Nakagami-m distribution covers no fading channel as m goes to infinity.

In this talk, we show the average transmission rate and bit error rate with delayed feedback channel information as a closed form. Our results are general in the sense that they contain the special cases of the previous works ([1], [3]) in which more simple assumptions on the system modeling is considered.

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