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On the Noncoherent Capacity of Doubly Selective Rician-Fading Channels under Peak-Power Constraint

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Upper and lower bounds are derived for the noncoherent capacity of Rician fading channel with time and frequency memory and constrained peak and average power. The peak power limitation is applied in the time domain. It is shown that these bounds can be split into two terms. For the upper bound, the first term is equivalent to the capacity of a time-invariant frequency selective channel whose frequency response corresponds to the root mean square frequency response of the studied channel, and for the lower bound, this term is the coherent capacity of the channel with a weighted SNR. For the two bounds, the second term is a penalty term, explicit in the Doppler spectrum of the channel, that captures the effect of the channel uncertainty induced by the noncoherent setting. Impact of channel parameters, such as delay and Doppler spread, on the capacity bounds are discussed and numerical applications on a real Rician channel are also provided.

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