Counting solutions for the CDMA multiuser MAP demodulator

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— We evaluate the average number of locally minimal solutions for maximum-a-
posteriori (MAP) demodulation in code-division multiple-access (CDMA) systems
[1]. For this purpose, we use a sophisticated method to investigate the ground state
properties for the Sherrington-Kirkpatrick-type (i.e. fully connected) spin glasses
established by Tanaka and Edwards [2] in 1980. We derive the number of locally
minimal solutions as a function of several parameters which specify the CDMA mul-
tiuser MAP demodulator. We also calculate the distribution function of the energies
for the locally minimum states. We find that for a small number of chip intervals
(or equivalently a large number of users) and large noise level at the base station,
the number of local minimum solutions becomes larger than that of the SK model
[3]. This provides us with useful information about the computational complexity
of the MAP demodulator [4].

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