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On differentiability of the Parisi formula

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Abstract

It was proved by Michel Talagrand in [10] that the Parisi formula for the free energy in the Sherrington-Kirkpatrick model is differentiable with respect to inverse temperature parameter. We present a simpler proof of this result by using approximate solutions in the Parisi formula and give one example of application of the differentiability to prove non self-averaging of the overlap outside of the replica symmetric region.

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