**Replica theory of partition-function zeros in spin-glass
systems** KAZUTAKA TAKAHASHI, Tokyo Institute of Technology,
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sitions in spin-glass systems by analysing the partition-function zeros
(Lee-Yang zeros) with respect to the complex temperature/field. For
several models as the random energy and spherical models with many-
body interactions, we extend the replica method and the procedure of
the replica symmetry breaking ansatz to be applicable in the complex-
parameter case. We derive the phase diagrams in the complex plane
and calculate the density of zeros in each phase. We find that there is a
replica symmetric phase having a large density near the imaginary axis
away from the origin. In the spin-glass phase, the density is finite only
when the chaos effect is present. This result indicates that the density
of zeros is more closely connected to the chaos effect than the replica
symmetry breaking. We also investigate the relevance of our result to
the finite-dimensional systems by studying the renormalization group
flow in the complex plane.

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