

Geometric characterization of SRB measures for surface diffeomorphisms

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We give some geometric conditions which are necessary and sufficient for the existence of Sinai-Ruelle-Bowen (SRB) measures for $C^{1+\alpha}$ surface diffeomorphisms. As part of our argument we give an original method for constructing first return Young Towers, which demonstrates that every hyperbolic measure, and in particular every SRB measure, can be lifted to such a tower. This method relies on a new result in nonuniform hyperbolicity theory which is of independent interest.