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Anisotropic Sobolev spaces adapted to piecewise hyperbolic dynamics

Strong ergodic properties (such as exponential mixing) have been proved for various smooth dynamical systems by first obtaining a spectral gap for a suitable "transfer" operator acting on an appropriate Banach space. Some natural dynamical systems, such as discrete or continuous-time billiards, are only piecewise smooth, and the discontinuities pose serious technical problems in the construction of the Banach norm. With Sebastien Gouezel (J. Mod. Dyn. 2010), we recently showed that classical tools such as complex interpolation on anisotropic Sobolev-Triebel spaces, and an old result of Strichartz on Fourier multipliers, can solve those problems, under a bunching condition. (The bunching condition replaces a smoothness assumption on the stable bundles which was necessary in a previous work.) I will also very briefly mention work in progress with Balint and Gouezel on the one hand, and Liverani on the other hand, the ultimate goal of which is to establish exponential mixing for continuous-time 2-d Sinai billiards.