BLOW-UPS OF CALORIC MEASURE AND APPLICATIONS TO TWO-PHASE PROBLEMS

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ABSTRACT. Let Ω^+ and Ω^- be disjoint time-varying domains in $\mathbb{R}_x^n \times \mathbb{R}_t$, $n \geq 2$, and let $\omega^\pm$ denote their associated caloric measures. Under appropriate mild non-degeneracy and regularity hypotheses on $\Omega^\pm$, mutual absolute continuity of ω^+ and ω^- on $E \subset \partial\Omega^+ \cap \partial\Omega^- \cap \operatorname{supp}\omega^+$ implies that the parabolic Hausdorff dimension of $\omega^+|_E$ is $n+1$ and the parabolic blow-ups of ω^+ at ω^+-a.e. point of E are equal to a constant multiple of the parabolic $(n+1)$-Hausdorff measure restricted to hyperplanes containing a line parallel to the time-axis.

This is a parabolic analogue of a result of Kenig, Preiss and Toro, and its proof involves a set of techniques based on parabolic tangent measures. These methods also have other applications, amongst which a caloric version of a theorem of Tsirelson about triple-points.

This is a joint work with Mihalis Mourgoglou.

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