

# The Li-Yau-Hamilton estimate and the Yang-Mills heat equation on manifolds with boundary

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May 8, 2008

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The paper pursues two connected goals. Firstly, we establish the Li-Yau-Hamilton estimate for the heat equation on a manifold  $M$  with nonempty boundary. Results of this kind are typically used to prove monotonicity formulas related to geometric flows. Secondly, we establish bounds for a solution  $\nabla(t)$  of the Yang-Mills heat equation in a vector bundle over  $M$ . The Li-Yau-Hamilton estimate is utilized in the proofs. Our results imply that the curvature of  $\nabla(t)$  does not blow up if the dimension of  $M$  is less than 4 or if the initial energy of  $\nabla(t)$  is sufficiently small. The paper is available at [arXiv:0803.1015v1](https://arxiv.org/abs/0803.1015v1) [math.DG].