

Abstract Submitted
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Bounds on the Nusselt Number for Marangoni Convection¹

GEORGE HAGSTROM, University of Texas at Austin, CHARLIE R. DOERING, University of Michigan — We use the background method to prove rigorous upper bounds on the Nusselt number in terms of the Marangoni number in Marangoni convection. When the Prandtl number is infinite $Nu \leq .84Ma^{2/7}$. For finite Prandtl number we proved that $Nu \lesssim Ma^{1/2}$. We compare these to numerical simulations by Boeck and Thess that suggest that for real flows $Nu \lesssim Ma^{2/9}$. We also use the background method and non-variational techniques to improve the lower bound for the critical Marangoni number for energy stability of the conduction solution in the infinite Prandtl number case.

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George Hagstrom
University of Texas at Austin

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