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Upper bounds on the heat flux in 2D Rayleigh-Bnard convection using a 2D background field method ZIJING DING, RICH KERSWELL, school of Mathematics, University of Bristol, BS8 1TW, UK — The background method [1] has proved a popular and effective technique for estimating the maximal heat flux possible in turbulent Rayleigh-Benard convection. In this method, the temperature is non-uniquely decomposed into a background field which satisfies the physical boundary conditions and a fluctuation field satisfying homogenous boundary conditions. So far, only a 1D background field (just varying with the wall normal direction) has been studied which has the effect of only imposing the horizontal average of the heat equation as a constraint [2]. Here we consider a 2D background field, which imposes the full heat equation, to bound the heat flux in 2D Rayleigh-Benard convection. The results of applying a time-stepping method, which has recently proved successful for the 1D background field case [3], to the extended variational problem will be discussed. References [1] C. R. Doering & P. Constantin, Phys. Rev. Lett., **69**, 1648-1651, (1992) [2] C. R. Doering & P. Constantin, Phys. Rev. E, **53**, 5957-5981 (1996) [3] B. Wen, G.P. Chini, R.R. Kerswell and C.R. Doering, Phys. Rev. E. **92** 043012 (2015)

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