

Abstract Submitted  
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**An investigation of implicit turbulence modeling for laminar-turbulent transition in natural convection**<sup>1</sup> CHUNGGANG LI, MAKOTO TSUBOKURA, Department of Computational Science, Graduate School of System Informatics, Kobe University, WEIHSIANG WANG, RIKEN, Advanced Institute for Computational Science — The automatic dissipation adjustment (ADA) model [J. Comput. Phys. 345 (2017) 462-474] based on truncated Navier-Stokes equations is utilized to investigate the feasibility of using implicit large eddy simulation (ILES) with ADA model on the transition in natural convection. Due to the high Rayleigh number coming from the larger temperature difference (300K), Roe scheme modified for low Mach numbers coordinating ADA model is used to resolve the complicated flow field. Based on the qualitative agreement of the comparisons with DNS and experimental results and the capability of numerically predicating a -3 decay law for the temporal power spectrum of the temperature fluctuation, this study thus validates the feasibility of ILES with ADA model on turbulent natural convection. With the advantages of ease of implementation because no explicit modeling terms are needed and nearly free of tuning parameters, ADA model offers to become a promising tool for turbulent thermal convection.

<sup>1</sup>Part of the results is obtained using the K computer at the RIKEN Advanced Institute for Computational Science (Proposal number hp160232)

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