Why is there dispersion in the measured scaling exponent of the Reynolds number in turbulent Rayleigh-Bénard convection?[1] CHAO SUN, KE-QING XIA, The Chinese University of Hong Kong — A riddle in turbulent thermal convection is the apparent dispersion from 0.42 to 0.5 in the value of the scaling exponent γ of experimentally measured Reynolds number $\Re \sim Ra^{\gamma}$, where Ra is the Rayleigh number. The measured Re may be divided into two groups: one based on the circulation frequency of the mean wind and the other based on a directly measured velocity. With new experimental results we show that in frequency measurements the dispersion in γ is a result of the evolution in the circulation path of the wind, and that in the velocity measurements it is caused by the inclusion of a counter-flow in the mean velocity. When these factors are properly accounted for both groups give $\gamma = 0.5$, which may imply that a single mechanism is driving the flow for both low and high values of Ra.

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