

# Semiparametric robust mean estimations based on the orderliness of quantile averages

Tuban Lee

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semiparametric | mean-median-mode inequality | asymptotic | unimodal  
| Hodges–Lehmann estimator

Furthermore, for weighted averages, separating the breakdown point into upper and lower parts is necessary.

*Definition .1* (Upper/lower breakdown point). The upper breakdown point is the breakdown point generalized in Davies and Gather (2005)’s paper (? ). The finite-sample upper breakdown point is the finite sample breakdown point defined by Donoho and Huber (1983) (1) and also detailed in (? ). The (finite-sample) lower breakdown point is replacing the infinity symbol in these definitions with negative infinity.

**Data Availability.** Data for Figure ?? are given in SI Dataset S1. All codes have been deposited in [GitHub](#).

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1. DL Donoho, PJ Huber, The notion of breakdown point. *A festschrift for Erich L. Lehmann* 157184 (1983).