Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

What do we mean by the mean conformation tensor (in viscoelastic turbulence)? ISMAIL HAMEDUDDIN, Norton-Rose-Fulbright, TAMER ZAKI, Johns Hopkins University — The popular arithmetic mean conformation tensor frequently used in the analysis of turbulent viscoelastic flows is not a good representative of the ensemble. Alternative means more faithful to the tensorial character of the conformation tensor are evaluated, namely, the geometric and log-Euclidean means. These means are mathematically consistent with the Riemannian structure of the manifold of positive-definite tensors, on which the conformation tensor lives, and have useful properties that make them attractive alternatives to the arithmetic mean. Using a turbulent FENE-P channel flow dataset, it is shown that these two alternatives are physically representative of the ensemble. By definition, these means minimize the geodesic distance to realizations and exactly preserve the scalar geometric mean of the volume and of the principal stretches.

Ismail Hameduddin
Norton-Rose-Fulbright

Date submitted: 01 Aug 2019 Electronic form version 1.4