# Description of Dataset

READ ME File For 'Dataset for "Mechanisms of mass transfer to small spheres sinking in turbulence"'

Dataset DOI: <https://doi.org/10.5258/SOTON/D2455>

This dataset supports the publication: Lawson, J., & Ganapathisubramani, B. (2023). Mechanisms of mass transfer to small spheres sinking in turbulence. Journal of Fluid Mechanics, 954, A15. doi:10.1017/jfm.2022.998

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The accompanying files contains all necessary data and code to reproduce figures 5-16 from the paper. Nomenclature used is (mostly) consistent with the paper.

Date that the file was created: 2022, November

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| **Folder** | **Description** |
| sim | MATLAB .m scripts to generate figures 7-16 from section 4 and provide an example of how to process the data in the associated .mat files |
| sim/data | MATLAB .mat (HDF5) files containing ensemble averaged single and two-time statistics of mass transfer rate obtained from simulations  |
| exp | MATLAB .m scripts to generate figures 5 & 6 from section 3 and provide an example of how to process the data in the associated .mat files |
| exp/data | MATLAB .mat (HDF5) files containing scalar field statistics extracted from particle tracking experiments |
| fig | Original MATLAB .fig files for figures 3- 16 |
| 3rdparty | Third party MATLAB code necessary to create figures |

## Experimental data

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| **File** | **Description** |
| index.xlsx | Operating parameters and details of different experimental runs for the particle tracking experiments |
| meanwake.mat | Scalar field statistics extracted from particle tracking experiments |

## Numerical simulation data

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| **File** | **Description** |
| ohashi.xlsx | Experimental data of mass transfer to particles sinking in vertical pipe flow, digitally extracted from Figure 1 of Ohashi et al. (1981), later incorporated into Figure 8 |
| ArmenanteThesisAppendix17.xlsx | Experimental data of mass transfer to microparticles in stirred tanks, extracted from Appendix 17 of Armenante, P. M. (1983), later incorporated into Figure 7a |
| correlation\_1040\_AR1\_fX.XX.mat | Two-time and correlation statistics for mass transfer rate and local Peclet number, for different filter timescales τf |
| ahat\_1e-1.mat | Contains single and two-time statistics of average mass flux from simulation timeseries for spherical particles with a/eta = 0.1 |
| ahat\_1e-2.mat | Contains single and two-time statistics of average mass flux from simulation timeseries for spherical particles with a/eta = 0.01 |