

Supplementary Information

ColHySE: An Advanced Column Hydrodynamic-based model for Solvent Extraction

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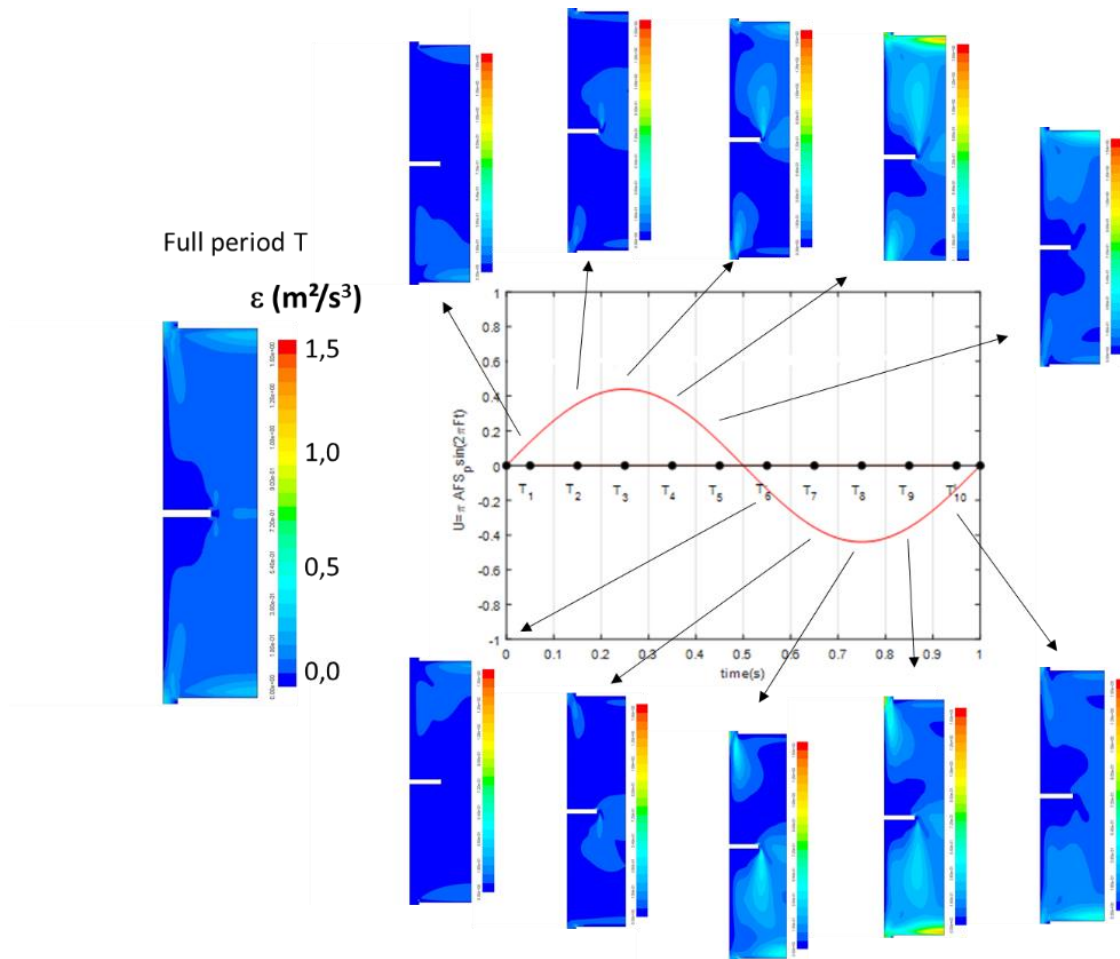


Figure SI-1: Contours of the time-average turbulent dissipation rate ε in a typical compartment of the column at $AF = 20$ mm/s. Left: contour of ε averaged over the full pulsation period T (method 1). Right: Contours of ε averaged on 10 successive time-steps of size $T/10$ (method 2). Note that the scale bar is the same in each case.

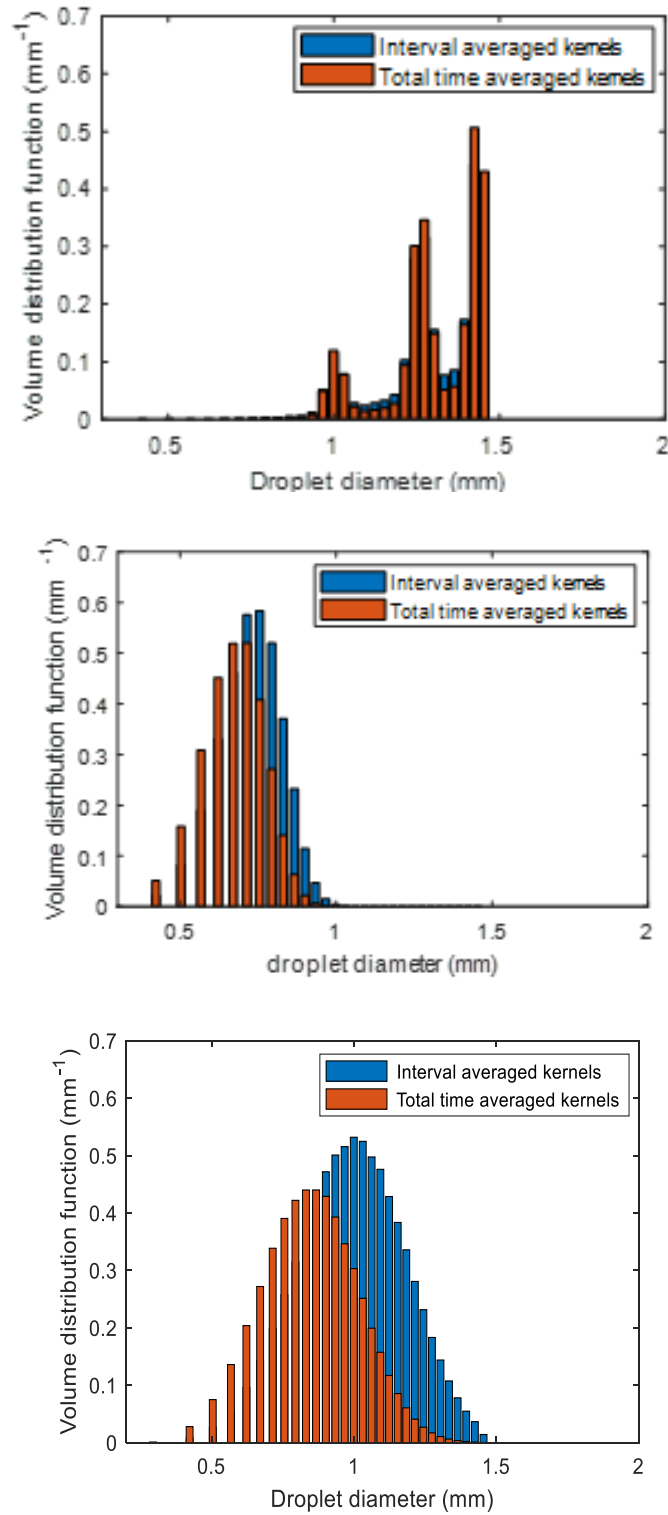


Figure SI-2: Comparison of the DSD predicted at the column center ($Z = 1$ m) depending on the time-averaging procedure of the turbulent dissipation probability function. From top to bottom: $AF = 20, 40$, and 60 mm/s. Inlet droplet diameter is 1 mm.

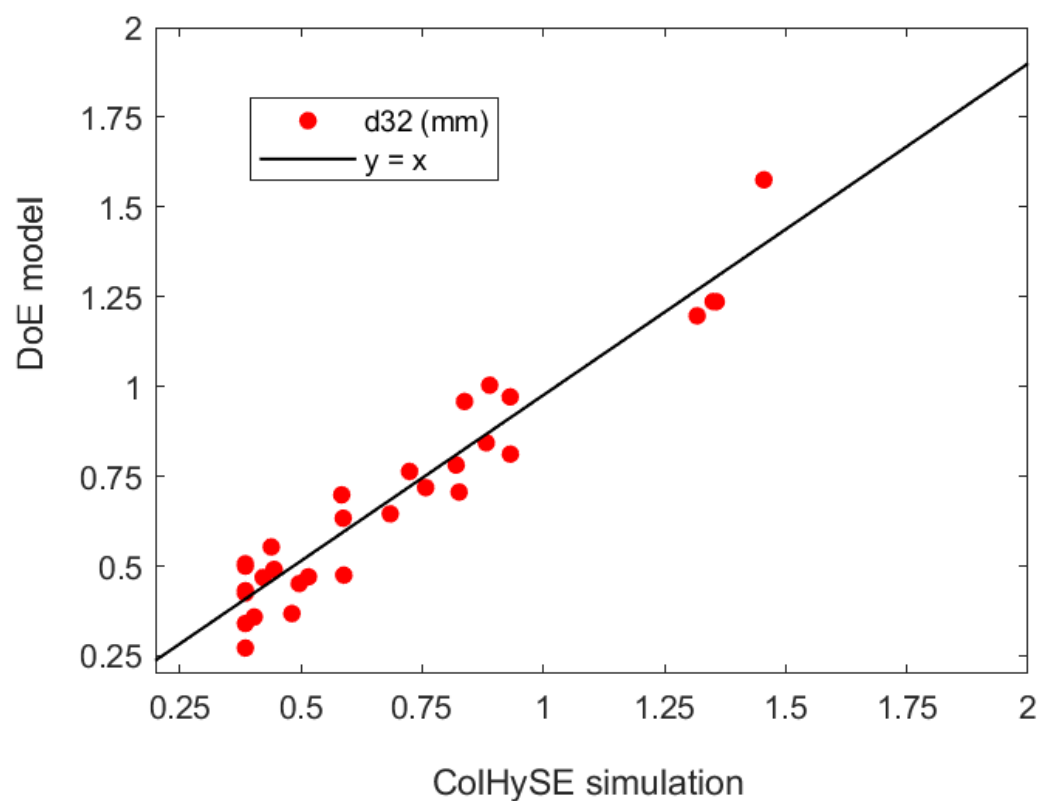
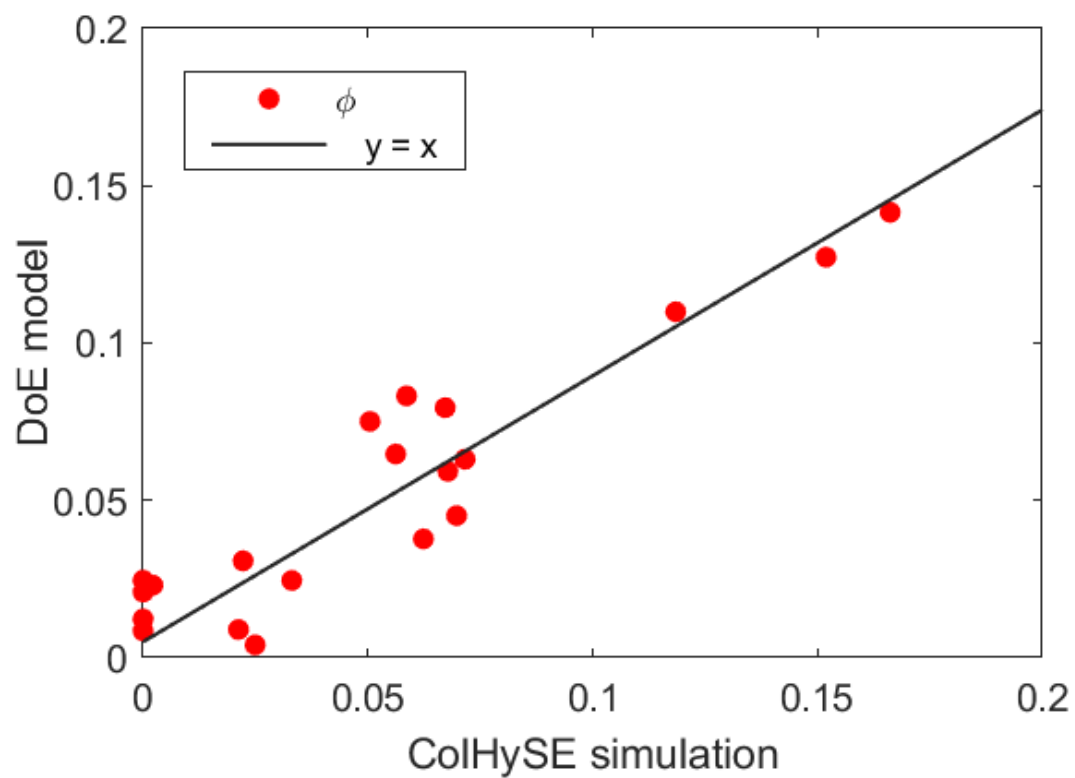


Figure SI-3: Comparison between the DOE model prediction (sec. 3.2) and ColHySE results (parity plot) for the dispersed phase holdup (top, residual standard error $R^2 = 0.802$) and the Sauter mean diameter (bottom, residual standard error $R^2 = 0.924$) in the middle of the column.

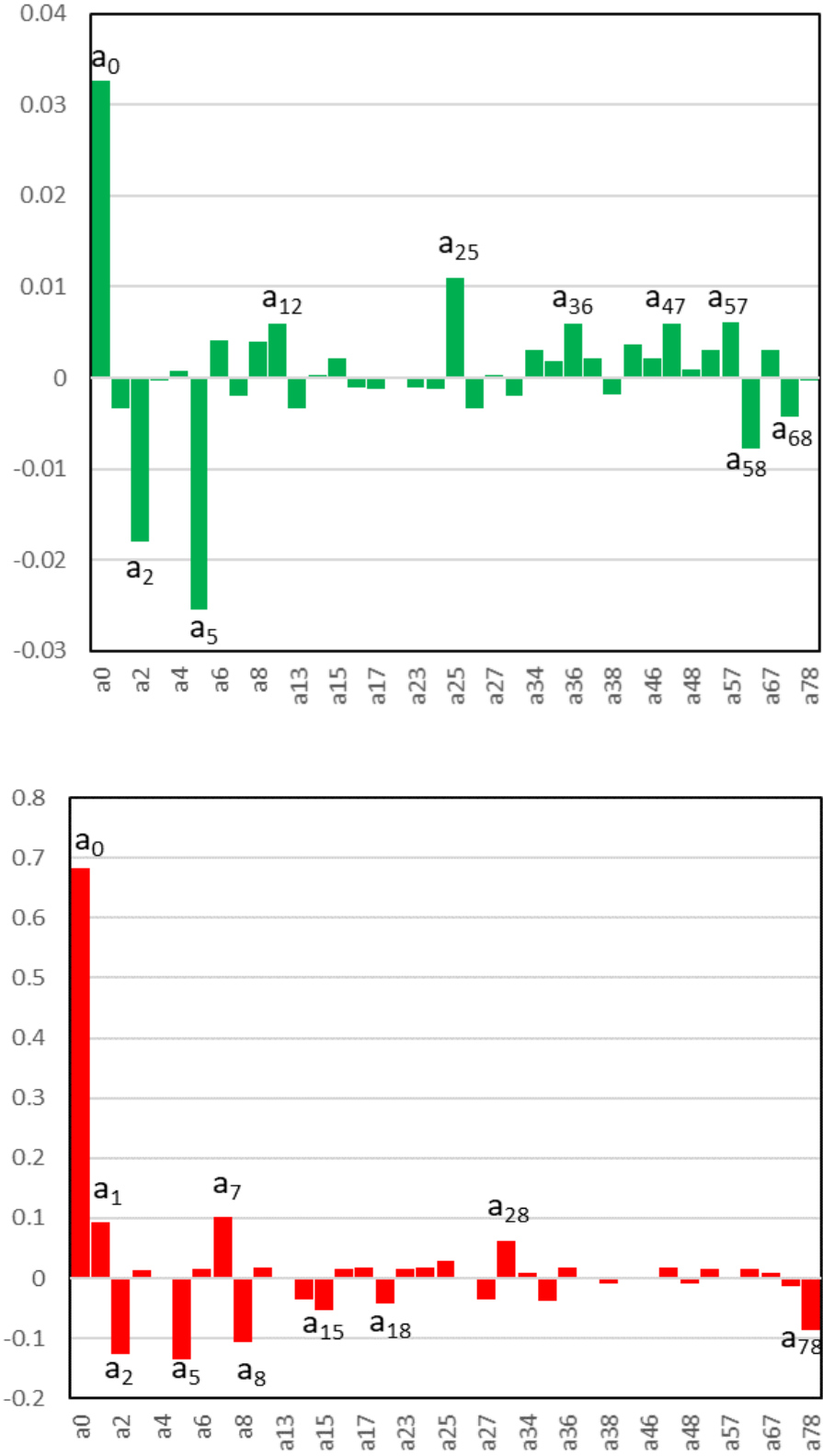


Figure SI-4: Interaction coefficients in Eq. (25) for the DOE in Sec. 3.2 (effect of the model parameters) – In green: for the holdup ($\hat{Y} = \hat{\phi}$) ; in red for the Sauter mean diameter ($\hat{Y} = \widehat{d_{32}}$). The i and j indexes of the interaction coefficients a_{ij} refer to the index of the parameters in Table. 2. In both figures, the 9 more influential parameters a_i are recalled in the figures.

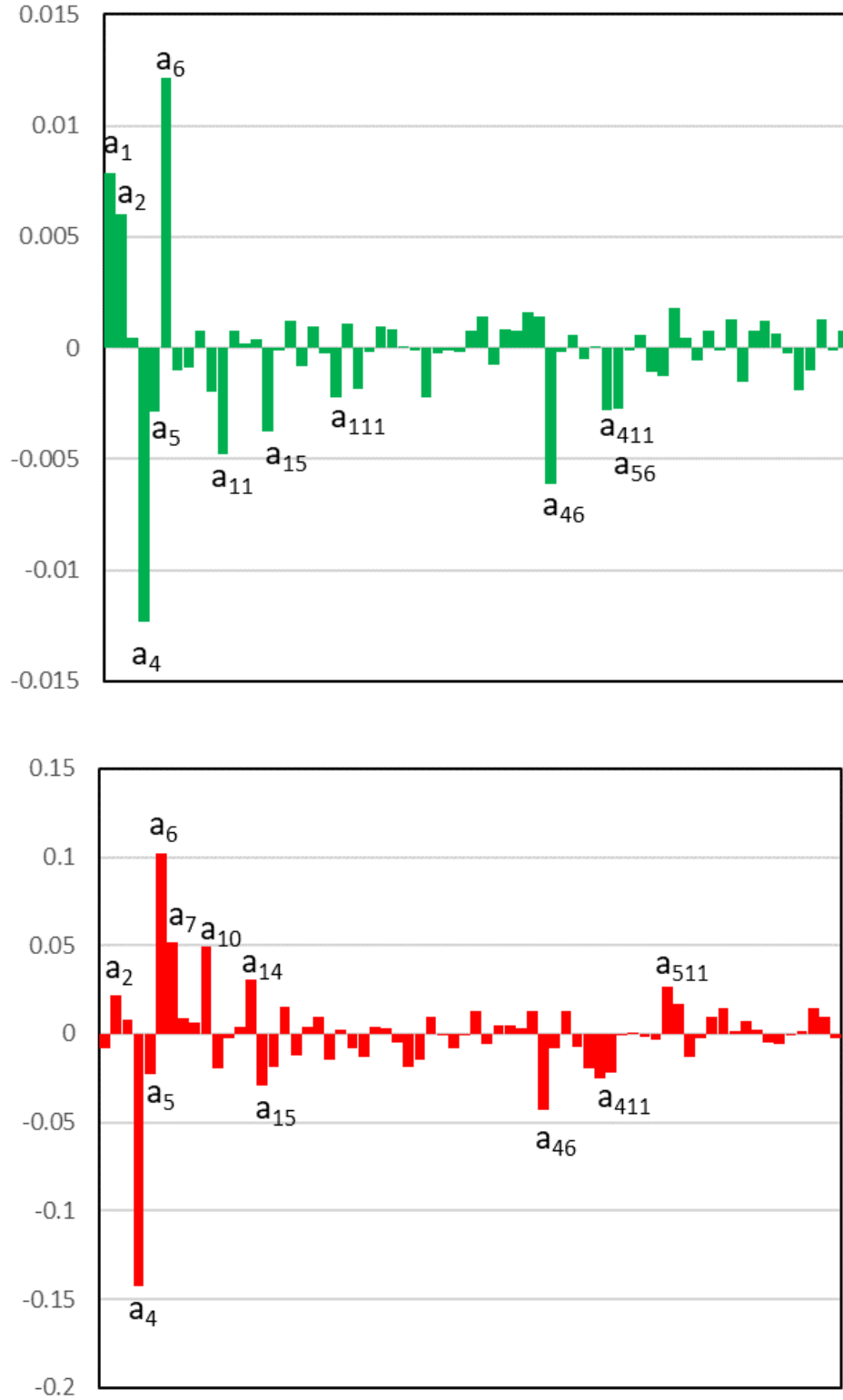


Figure SI-5: The interaction coefficients of Eq. (25) for the DOE in Sec. 4.1 (effect of the operating parameters). In green: for the holdup; in red: for the Sauter mean diameter. The i and j indexes of the interaction coefficients a_{ij} refer to the index of the parameters in Table. 3. Note that the 67 x-labels are not displayed and the constant a_0 ($a_0 = 1.49$) is not shown for the sake of visibility. In both cases, the 12 more influential parameters a_i are recalled in the figures.

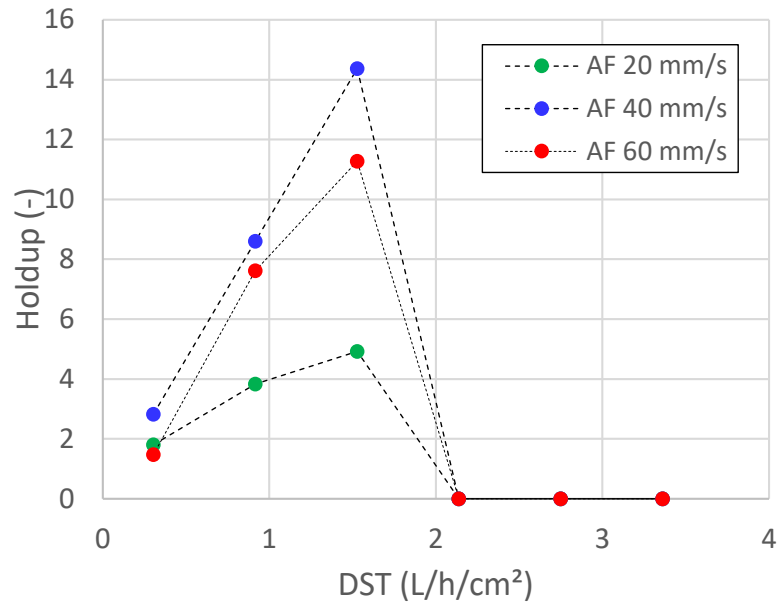


Figure SI-6: Evolution of the holdup in Oil-in-Water mode (TPH in Water) in the 25-ID pulsed column, in the case $Q_c/Q_d = 0.5$

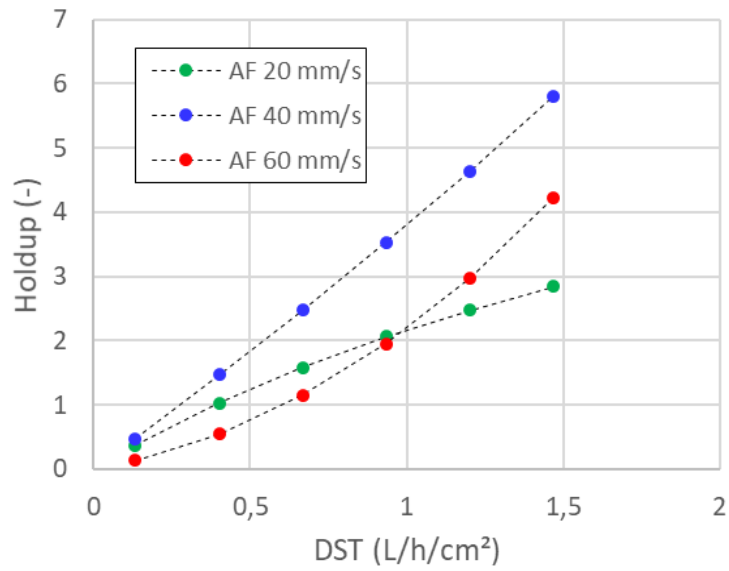


Figure SI-7: Evolution of the holdup in Oil-in-Water mode (TPH in Water) in the 25-ID pulsed column, in the case $Q_c/Q_d = 3.2$