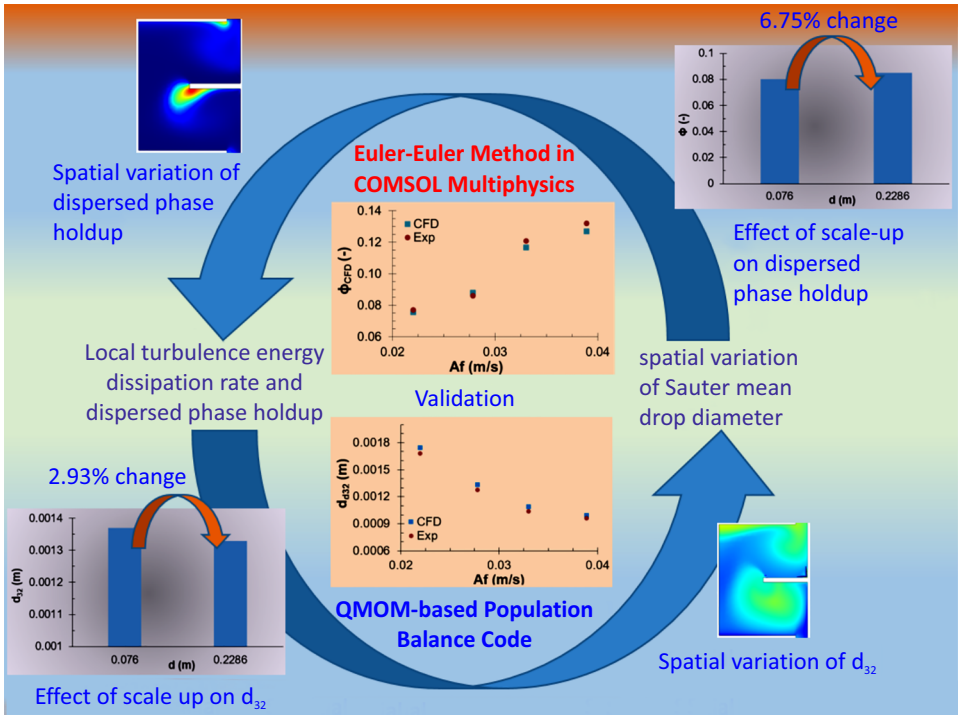
CFD–PB modelling of pulsed disc and doughnut column



Coupled CFD-PB modelling is used to estimate dispersed phase holdup and Sauter mean drop diameter for liquid-liquid two-phase flow in a pulsed disc and doughnut column.*

PULSED DISC and DOUGHNUT COLUMN (PDDC) is a modified design of PULSED SIEVE PLATE COLUMN (PSPC). In a PDDC, sieve plates are replaced by disc and doughnut shaped plates. Unlike a PSPC which has sieve plates containing small holes, internals of PDDC allow it to handle feed containing solids without tendency of chocking. For identical geometry and operating conditions, a PDDC has higher dispersed phase holdup than a PSPC resulting in lower HETP in PDDC compared to PSPC.In a recent article (Sarkar et al., 2020, 'CFD-PB Modelling of Liquid-liquid Two-phase Flow in Pulsed Disc and Doughnut Column', Solvent Extraction and Ion Exchange, 38:536) CFD-Population Balance (CFD-PB) modelling to estimate dispersed phase holdup and Sauter mean drop diameter in a PPDC is reported. Prediction of these hydrodynamic variables is important to estimate specific interfacial area available for mass transfer. An in-house Quadrature Method of Moment (QMOM) code is coupled with a CFD solver using the methodology pictorially shown above. The CFD-PB model is validated with experimentally measured dispersed phase holdup and drop diameter. Further, the CFD-PB model is used to check the validity of the scale-up scheme proposed in literature.

**S. Sarkar*
Chemical Engineering Division
Chemical Engineering Group, BARC