MIXING AND REACTION IN HETEROGENEOUS MEDIA

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Observed chemical transport and reaction behaviors in heterogeneous media are quantita- tively and qualitatively different from the ones expected for equivalent homogeneous media. Spatial fluctuations in the physical and chemical medium properties can lead to early of late solute arrivals, forward and back tails of spatial solute distribution and enhanced spread- ing. Mass transfer over the complex heterogeneity-induced interface interfaces acts on both mixing and reaction. It leads to local non-equilibrium, which can enhance mixing and mixing-induced chemical reactions. Rates of heterogeneous reactions may be smaller than expected because of mass transfer limitations. Characterization and quantification of these phenomena on the large scale rely on support volumes that are in general not well-mixed. Incomplete mixing limits the applicability of classical approaches that rely on well mixed support volumes. It also limits the applicability of approaches that describe only the evo- lution of the mean concentration because the quantification of mixing as well as chemical reactions in general requires information of concentration variability on the support scale. This presentation wants to give a brief account on approaches to quantify heterogeneity- induced mixing and reactive transport.