# Simulation of Gas/Liquid Membrane Contactor with COMSOL Multiphysics®

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## Abstract

A comprehensive mathematical model that includes mass, momentum and heat transfer was developed for the transport of gas mixture of carbon dioxide and methane through hollow fiber membrane (HFM) contactors (Figure 1). COMSOL Multiphysics® was used in solving the set of partial, ordinary and algebraic equations. The model was based on "non-wetted mode" in which the gas mixture filled the membrane pores for countercurrent gas-liquid contact. Axial and radial diffusion inside the hollow fiber membrane, through the membrane skin, and within the shell side of the contactor were considered in the model. Furthermore, the model was validated with the experimental results obtained for carbon dioxide removal from CO2/CH4 gas mixture using custom made polyvinylidene fluoride (PVDF) membrane contactor. The effect of inlet gas and liquid temperature on the membrane performance was investigated. The effect of module packing factor was also investigated. The modeling predictions were in good agreement with the experimental results.

# Figures used in the abstract

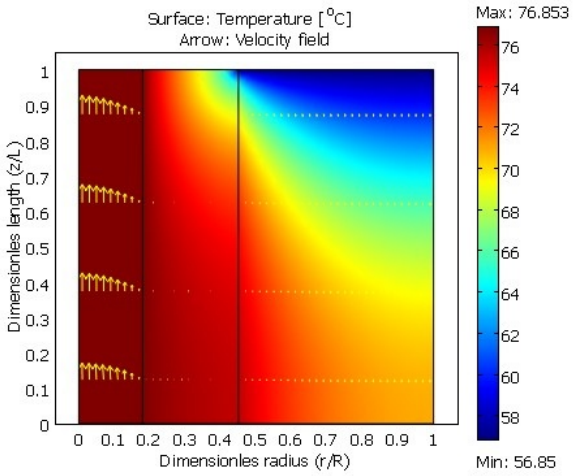


**Figure 1**: Surface plot of temperature and velocity profile