Our experiment deals with making two fluids mix in a Y-channel of micro-meter dimension which contains an inverted triangle obstacle arrangement. Fluids used are distilled water and a Rhodamine solution of 0.001 miliMolar concentration. The channel is observed through a fluorescent microscope and images are taken by a CCD camera. Speed used to pump the fluids is taken as 0.3 m/s and Reynolds number is controlled around a value of 11. Four sets of images are taken: first, with only water in the channel, second only rhodamine solution in the channel, third perfectly mixed solution of equal volumes of water and rhodamine solution (prepared earlier) and fourth, an empty channel for background subtraction. Algorithms have been prepared for image processing and analysis to calculate the mixing index of the two fluids. First is the edge-detection algorithm along with background subtraction, which gives us the region of interest (the channel). Second is the calculation of sample standard deviation of a particular column of pixels at a particular length of channel, in the image. This standard deviation, after mapping onto the scale of (0-1), corresponds to the mixing index at a particular length of channel.

We have also performed a COMSOL simulation which gave us slightly different results. We got 66.2% mixing index at the end of the channel while simulation shows 43.7% index at the outlet.