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**Swimming microalga as a micro-mixer in confined spaces.**[1] MOJTABA JARRAHI, PEDRO ARANA-AGUDELO, Universit Paris-Sud, LIMSI-CNRS, ADAMA CREPPY, Universit Paris-Sud, FAST-CNRS, BEHNAM TAIDI, CentraleSuplec - LGPM, HAROLD AURADOU, Universit Paris-Sud, FAST-CNRS — The unicellular green alga Chlamydomonas uses two anterior flagella to swim in a breaststroke-like pulling motion, covering a distance of about seven to ten times its body size per second. This fast swimmer stirs the surrounding fluid like a mobile micro-mixer. How strong is this mixing? The few studies available on this subject, measured the diffusion of tracer particles around Chlamydomonas (a single cell or/and a suspension) to show mixing enhancement. However, we know that mixing process consists of folding and stretching of fluid elements. Diffusion of the tracer particles can not be enough appropriate to characterize mixing features. In this work, we follow the separation of the tracers, initially close together, when swimming of a Chlamydomonas cell influences them. In this way, we quantify the mixing in different zones around the microswimmer. Some other aspects of the motility of Chlamydomonas in a confined environment, like residence time and light effects, are also investigated. Microscopy of Chlamydomonas and the tracers (Carboxylated yellow-green polystyrene microspheres, diameter = 0.5 $\mu$m) was carried out inside square bottom well arrays (125$\mu$m x 125$\mu$m x 60$\mu$m).

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Mojtaba Jarrahi
Universit Paris-Sud, LIMSI-CNRS

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