

---

# Experimental study of the transport of microplastics in sewage

Okba Mostefaoui<sup>\*1,2</sup>, Diego Lopez<sup>3</sup>, Emmanuel Mignot<sup>3</sup>, and Valérie Massardier-Nageotte<sup>4</sup>

<sup>1</sup>Ingénierie des Matériaux Polymères – Université Claude Bernard Lyon 1, Institut National des Sciences Appliquées de Lyon, Université Jean Monnet [Saint-Etienne], Centre National de la Recherche Scientifique : UMR5223 – 20 Av. Albert Einstein 69621 Villeurbanne Cedex, France, France

<sup>2</sup>Laboratoire de Mécanique des Fluides et d'Acoustique – Institut National des Sciences Appliquées de Lyon, Centre National de la Recherche Scientifique : UMR5509, Ecole Centrale de Lyon, Université Claude Bernard (Lyon I) – 20 av. Albert Einstein 69621 Villeurbanne, France, France

<sup>3</sup>Laboratoire de Mécanique des Fluides et d'Acoustique – Institut National des Sciences Appliquées de Lyon, Centre National de la Recherche Scientifique : UMR5509, Ecole Centrale de Lyon, Université Claude Bernard (Lyon I) – 20 av. Albert Einstein 69621 Villeurbanne cedex, France, France

<sup>4</sup>Ingénierie des Matériaux Polymères – Université Claude Bernard Lyon 1, Institut National des Sciences Appliquées de Lyon, Université Jean Monnet [Saint-Etienne], Centre National de la Recherche Scientifique : UMR5223 – 17, Av. Jean Capelle 69621 Villeurbanne Cedex, France

## Abstract

Wastewater treatment plants (WWTP) do not stop all microplastic wastes carried by sewage. Combined sewage overflows (CSO) are structures that prevent saturation of WWTP, by diverting excessive volumes of water, coming from heavy rain events to receiving water bodies such as rivers, and lakes that could reach the oceans. To understand the process involved in the transport of microplastics in sewage, we first developed a dispersion process to manufacture model microparticles of defined size and density in order to control the characteristics of the microplastics that we are interested in. This protocol allows the introduction of markers such as a fluorescent dye (Rhodamine B), into the solid phase. Our laboratory-made particles were then seeded in experimental benches of open channel flows representative of structures present in sewage. In order to study the transport of these plastic particles. 3D velocimetry techniques allowed us to obtain the time-dependent velocity field of the flow, and, at the same time, the trajectories of our model particles through the same flow. The collected data enabled us to estimate important transport characteristics such as residence time, trapping and aggregation zone in the centre of flow vortices.

**Keywords:** microplastics, model particle, transport, sewage, combined sewage overflow.

---

<sup>\*</sup>Speaker