30.11.2023

Master thesis topic:

Inception of Transport of Litter Under Pluvial Conditions

To start: **flexible, before September of 2024**

Duration: 6 months.

Location: Experimental tests at the University of A Coruña (three months, costs funded). The rest at IWG (KIT).

In collaboration with Imperial College London, Deltares, Photrack and University of A Coruña.

Background

Urban setups are hotspots of litter pollution, but little is known about how litter is transported by rainfall and surface flow, and their combination, or how they are retained in the urban drainage. Many types of plastics, with different types of shapes and sizes, are leaked during human activities. These can be transported by runoff into the urban drainage or other water systems, being this point the start of a potentially long and fast conveyance. However, very little is known about how plastics start their transport and more recent studies argue that a relationship between rainfall and plastic budgets in water systems is not easy to establish, indicating that mechanics can be more complicated than anticipated.

Experimental Tests

Based on these considerations, we propose to experimentally study the early movement of common litter found in floods in the STREET platform (at the University of A Coruña) under varying rain (i) and runoff (ii) characteristics for different types of configurations. The monitoring of the movement will be done via in-house PTV (Particle Tracking Velocimetry) systems, enhanced by additional cameras provided by PHOTRACK and their velocimetry analysis algorithms.

Figure 1 | Urban laboratory of the University of A Coruña.

Detailed work plan:

1. Literature review on plastic transport.
2. Data acquisition with state-of-the-art experimental methods.
3. Description of dynamic of onset of movement of selected plastics.

4. Large experimental campaign and statistical analysis.
5. Critical assessment of the first results and decision on further experimentation.
6. Preparation of the written research master thesis.

Terms

Supervision:

Prof. Dr. Mário J. Franca
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Dr. Daniel Valero (upcoming Imperial College London).

Recommended knowledge:

- Hydraulic engineering.
- Laboratory experiments.
- Data analysis.

Start:

Flexible, before September of 2024