



ESPCI
Laboratoire PMMH
10 rue Vauquelin, 75231 Paris Cedex 05



Séminaire PMMH

Amphithéâtre Langevin (A4), Escalier N, 2^{ème} étage

Vendredi 24 février 2017, 11h00-12h00

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LadHyX - CNRS - École Polytechnique

Catching drops with fibers

In this talk, I will present recent results on the capture of aerosol droplets with a textile, i.e. a fibrous material. Fibrous media are commonly used to collect droplets from an aerosol; woven nets are used to harvest fresh water from fog, and non-woven entangled fibers are used to filter oil drops from gas streams. Here we consider a novel collection system made of an array of parallel fibers. We study this system experimentally with an environmental wind-mist tunnel, and find that in that case, the collection flow rate is constant and can be adjusted by varying the inter-fiber spacing. In particular, the collection efficiency strongly depends on the size and distribution of the drops formed on the fibers. Considering the coupling of wind flow, droplet trajectories and wetting of the fibers, we develop a theoretical model that allows us to predict the collection efficiency.

As the droplets accumulate on the fibers, they might merge and bridge adjacent fibers. We study this capillary adhesion in a model two fibers experiment, and report two types of wet adhesion : a weak capillary adhesion, where a liquid drop bridges the fibers and the force is proportional to the wetted length, and a strong elastocapillary adhesion where the liquid is spread between two collapsed fibers and the force is actually constant due to an elastocapillary coupling.

In addition, I will present art installations that we have created based on our findings.

Prochain séminaire : vendredi 3 mars, Patrick Guenoun (CEA Saclay)

Programme des séminaires : www.pmmh.espci.fr, onglet *Séminaires PMMH*

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