Deposition of rain in the built environment studied at droplet scale: rain droplet impact, film forming and runoff

Record number : OPR-484

Overview

RESEARCH DIRECTION

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INFORMATION

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ADMINISTRATIVE UNIT(S)

Faculté de génie
Département de génie civil et de génie du bâtiment

LEVEL(S)

2e cycle
3e cycle

LOCATION(S)

Campus principal

Project Description

The physics of wetting of porous media by rain must take into account that, during rain, the raindrops not only spread, but may also splash or bounce, even roll down on inclined surfaces depending on rain droplet impact velocity and angle. A phase diagram will be developed to document the behavior of droplets impacting on porous surfaces with different roughness, porosity, moisture transport properties of substrate, angle of attack, impact speed. This knowledge is acquired experimentally through using shadowgraphy and neutron imaging and is further studied by physical modeling of the droplet behavior. This study takes into account the rate of absorption and water distribution in porous material. Hygrothermal transport model is used to study the adsorption, redistribution and drying of droplets in porous materials exposed to a stochastic distribution of impacting droplets. Additionally, film forming and run-off will be modeled using a lubrication model. This project allows integrating droplet behavior in predicting the wetting, drying and runoff of water in the built environment at urban scale.

Candidates must have a background in building, civil or mechanical engineering, or applied physics. Candidates must be curious, creative, rigorous, and highly motivated. Candidates will gain knowledge in droplet, building and urban physics, advanced imaging and porous materials.

Discipline(s) by sector

Sciences naturelles et génie

Génie civil

Funding offered

Yes

The last update was on 22 June 2026. The University reserves the right to modify its projects without notice.