

## Internship offer - M2

<b>Title</b>	<b>Modelling of thermal stratification and natural convection flow in a dome</b>	
<b>Student level</b>	M2 research	
<b>Starting date</b>	February/March 2023	
<b>Duration</b>	5 to 6 months	
<b>City, Country</b>	Le Bourget du Lac, FRANCE	
<b>Laboratory</b>	LOCIE - Laboratoire prOCédés énergie bâtimEnt <a href="https://www.univ-smb.fr/locie/">https://www.univ-smb.fr/locie/</a>	
<b>Internship description</b>	<p>Urban areas are more and more suffering from heat waves. These heat waves, are extreme events, which will occur more and more in following decades, because of the global warming. It is therefore necessary to be able to model and study the behavior in studies under such extreme conditions.</p> <p>To that goal, this work takes place in the context of a project aiming at reproduce district and cities, at reduced scale, inside a monitored experimental setup (a dome of seven meters in diameter in which an urban atmosphere is generated in terms of temperature, radiation and pollution). The aim is to study microclimatic conditions in terms of urban heat island, heat motions. However before building this ambitious experimental setup, it is necessary to pre-design some aspects of this facility numerically.</p> <p>The goal of this research internship is to reproduce analytically and numerically, the experimental apparatus, as well as its immediate environment. The experimental apparatus will consist of a small reduced scale district (approx..1x1m<sup>2</sup>) which will be submitted to solar radiation from the sun (uniform heat flux condition). The focus will be here on the modelling of the natural convection induced by the heat source and its interactions with the climatic enclosure.</p> <p>To that aim the candidate will first conduct analytical study and then confront them to Computational Fluid Dynamics models that will need to be developed. Either Open Foam or Ansys Fluent will be used for the studies.</p>	
<b>Candidate</b>	The candidate should have a taste for numerical modelling of fluid dynamic. The candidate must have a prior knowledge on CFD and its tool (Fluent – Open Foam)	
<b>Traineeship grant</b>	Legal internship gratification (~575 €/month)	
<b>Supervisors</b>	Martin Thebault <a href="#">LinkedIn</a> / <a href="#">ResearchGate</a> (LOCIE – Le Bourget du Lac)	Christophe Ménézo (LOCIE – Le Bourget du Lac)
<b>Deadline</b>	Send CV + Cover Letter to <a href="mailto:martin.thebault@univ-smb.fr">martin.thebault@univ-smb.fr</a> deadline 15 November	
<b>References</b>	<p>Garnier, C. (2014). Modélisation numérique des écoulements ouverts de convection naturelle au sein d'un canal vertical asymétriquement chauffé (Doctoral dissertation, Université Pierre et Marie Curie)</p> <p>Morton, B. R., Taylor, G. I., &amp; Turner, J. S. (1956). Turbulent gravitational convection from maintained and instantaneous sources. Proceedings of the Royal Society of London. Series A. Mathematical and Physical Sciences, 234(1196), 1-23.</p>	