LIQUID FILM ENTRAINMENT ON A SURFACE IN MOVEMENT

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Nowadays, the modelisation and numerical simulation of a liquid film formed by impinging droplets is of first necessity. For instance, it would enable to control the water flowing across a windshield towards the side glass, which could affect the visibility of the driver. Furthermore, it could help to avoid that water collected in the cavity between the hood and the windshield enters into the air-conditioning intake and humidifies the cockpit.

A lagrangian formulation considering the film as a set of several discrete particles was tested and shown very poor results, making it unusable.

Therefore, an Eulerian modelisation was developed by FLUENT France. This model was tested on several geometries involving a coflowing gas and/or the gravity and the results were compared to theoretical predictions. Several other improvements were also added to the model, like the implementation of the gravity leveling term, responsible of the spreading of the film. Contours of film thickness on an inclined plate validating this approach are shown below.

Furthermore, the model was extended to predict overflowing of small cavities such as the one located between the windshield and the side glass. The proposed approach was approximate but will allow this Eulerian liquid film model to be included in a complete car aerodynamic computation.

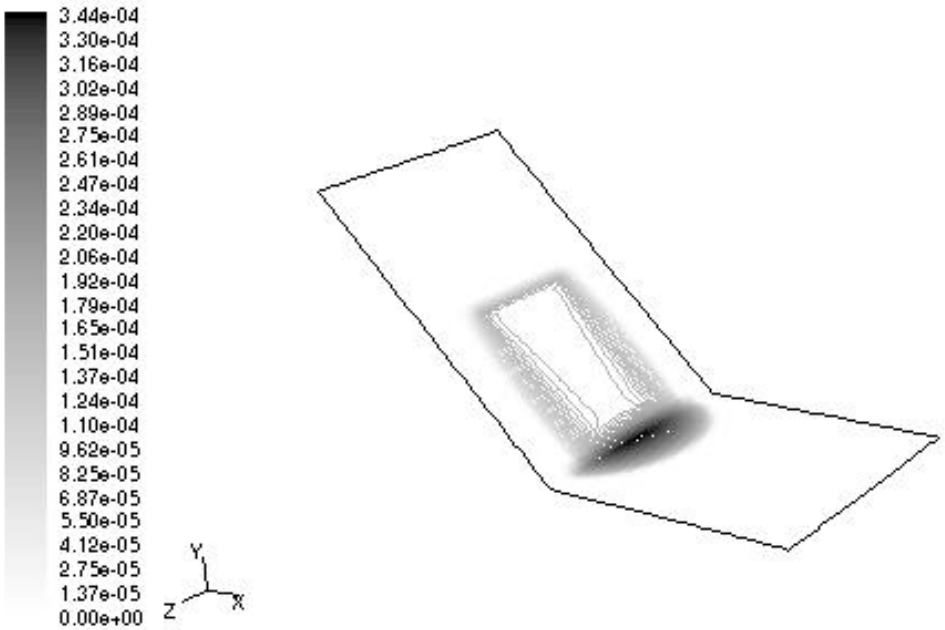

Figure 1: Thickness of a liquid film submitted to gravity on an inclined plate