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Shapes of Floating Liquid Sheets Spreading Against an Imposed Bath Flow JULIEN SEBILLEAU, LUC LEBON, Laboratoire MSC, LAURENT QUARTIER, PMMH-ESPCI, LAURENT LIMAT, Laboratoire MSC — We have investigated the spreading from a central static source of a viscous floating liquid sheet, above a more heavy bath, the bath itself drifting at a constant imposed velocity. This kind of situation is of great interest for environment problems and for industrial processes. The sheet exhibits surprising change of shape depending on its own flow rate and on the velocity of the bath. Circular for a static bath, it becomes oval at low velocity and exhibits a ribbon like shape at high velocity. In this high velocity limit, the sheet shape is initially oval and exhibits a transition to the "ribbon" shape, across a transient pear like shape. At low flow rate and high velocity, the ribbon becomes unstable and pinch off occurs. We have also investigated theoretically the evolution of the thickness distribution of the sheet. Because of complicated competitions between the sheet and bath viscosities, surprising behaviors can take place. For instance, in the case of a static bath and depending on the sheet flow rate, the final thickness can be larger than the static equilibrium height predicted by Langmuir.

Laurent Limat
Laboratoire MSC

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