

Flow visualization experiments on “Pele’ s hair” formation

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In the session of the kitchen Earth Science last year, we presented an analog experiment on “Pele’ s hair” which could be observed in the volcanic products in Hawaii Islands. We’ d succeeded in producing similar texture of “Pele’ s hair” by using a cotton candy machine we had invented, and showed that the texture of the sugar fibers (e.g. their thickness and length) depends on several important parameters such as rheological properties of the melted sugar, initial temperature at the outlet of the melted sugar jet, and its ejection speed. Recently we have conducted flow visualization regarding this analog experiment to understand the flow behavior around the melted sugar jet. The experimental setup for flow visualization consists of the cotton candy machine, commercial humidifiers for the flow tracers, and a LCD projector to generate multi-color light sheets. The flow behavior was recorded by a high-speed video camera; the eddies and vortices were clearly observed around the rotating dishes, which affect the formation process of the analog “Pele’ s hair” . We also examined effect of the following parameters such as the rotating speed, heating temperature, diameter of the outlets, which cause a variation in the texture of the cotton candy as reported the last presentation.

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