Notice! The video cannot be seen directly on Web. One has to download the file in one's computer and see the video on it.

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Notes on "Video file: Simple demonstration of a rarefied gas flow induced over a plane wall with a temperature gradient"

Yoshio Sone

This article is the explanatory notes on the video file uploaded at the same address (http://hdl.handle.net/2433/120983) as this article in Kyoto University Research Information Repository. In the experiment shown in the video, a rarefied gas flow induced over a plane wall set vertically and heated on its lower part is detected by a small windmill in front of the plate. The experiment is done under the pressure from the atmospheric condition down to 0.5 Torr in a vacuum chamber prepared in a bell jar found in most of chemistry departments. With decrease of the pressure, the transition from an upward flow due to natural convection to a downward rarefied gas flow induced by a temperature gradient on the wall is observed by the reversal of the direction of rotation of the windmill. More about the experiment, its physical mechanism, and mathematical analysis are explained in Refs. [1]–[4]. The present video file is the digitized version, with a new reference page added, of one of the old video films of several types of the experiment done by the author in the late 1980's. The video file of limited-size without sound explanation being not so explanatory, the readers are advised to read the explanation in Ref. [1] or in Section 5.1.1 of Ref. [2]. The bell jars in the video and in Ref. [1] are the same, but the plate and the vanes of the windmill in the experiment of Ref. [1] are simpler so that one can prepare the experimental apparatus and perform the experiment by oneself easily.

Incidentally, a more quantitative experiment of the flow induced over a plane wall with a temperature gradient is carried out in Ref. [5]. One can perform this experiment by oneself equally easily.

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References

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