though there is no fundamental reason why this should not be improved.


### Reference

[1] Persson, S. L., "Method for determination of velocity distribution in a thin film," AIAA J. 2, 372–373 (1964).

[2] Jeffrey, R. C., "Particle motion in Poiseuille flow," Ph.D. Thesis, Univ. of Cambridge, (1964).

[3] Nedderman, R. M., "Velocity profiles in thin liquid layers," Ph.D. Thesis, Univ. of Cambridge (1960); available in microfilm from Micro Methods Ltd., East Ardsley, Wakefield, Yorks, England.

[4] Nedderman, R. M., "The use of stereoscopic photography for the measurement of velocities in liquids," Chem. Eng. Sci. 16, 113 (1961).

[5] Wilkes, J. O. and Nedderman, R. M., "The measurement of velocities in thin films of liquid," Chem. Eng. Sci. 17, 177 (1962).


## Reply by Author to R. M. Nedderman


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Nedderman observes that the main assumption in my method concerning the uniform distribution may be doubtful. This argument was based on experiments done by Jeffrey in full tube Poiseuille flow. According to the comment, Jeffrey's experiments have shown that migration may occur. The physical reasons for this migration are, however, not clear to the author from the comment, and it is thus difficult to imagine what kind of effect one would expect in thin water films.

From the velocity profiles given in Ref. 1 it may be noticed that $dv/d\delta$ approaches zero at $\delta = 0$. This may be regarded as supporting Nedderman's comment. In profiles measured at lower mean film velocities (and thus thicker films), this effect does not occur, however, as can be observed from Fig. 1.

Another possible explanation for the slope of the profiles given in Ref. 1 might be slip flow due to the use of particles that are too big compared to the film thickness. The results given in Fig. 1 were obtained with particles of the same size but with films of the order of five times the thickness of the previously studied rapid films. However, this eventual slip flow effect needs further investigation.

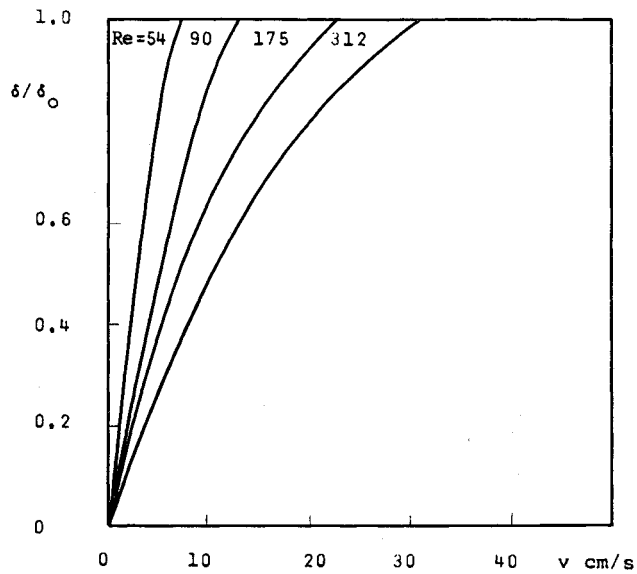


**Fig. 1 Influence of Reynolds number on velocity profiles without concurrent air flow.**

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* Head, Physics Section, Research Department.


### Reference

[1] Persson, S. L., "Method for determination of velocity distribution in a thin liquid film," AIAA J. 2, 372–373 (1964).


## Erratum: "Comment on 'Equilibrium Orientations of Gravity-Gradient Satellites'"


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[AIAA J. 2, 1357 (1964)]

In the above Technical Comment, Eq. (3) should read

$$C\ddot{\gamma} + \Omega^2(A - B)\gamma - \Omega(A - B - C)\dot{\beta} = 0$$

The symbol $\ddot{\gamma}$ dropped out after final page proofs had been released.

Recieved July 27, 1964.

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## One-Dimensional Rayleigh Flow of a Partially Ionized Gas


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### Nomenclature

| | | |
|---|---|---|
| $\rho$ | = | gas density $nm$, where $n$ is the total number of heavy particles per cubic centimeter, i.e., the number density of ions and neutral atoms (not the number density of neutral atoms alone as suggested by Yen) |
| $A$ | = | area of the channel |
| $u$ | = | gas velocity in the channel |
| $q$ | = | energy supplied per cubic centimeter per second to the flowing gas |
| $m$ | = | mass of a neutral atom |
| $m_e$ | = | mass of an electron |
| $\alpha$ | = | degree of ionization |
| $T$ | = | absolute static temperature of the flowing gas |
| $X$ | = | ionization potential of the neutral atom |
| $p$ | = | static pressure of the flowing gas |
| $2\pi\bar{h}$ | = | Planck's constant |
| $h$ | = | specific enthalpy of the flowing gas |
| $(g_0)_a$, $(g_0)_i$ | = | ground state statistical weights of the neutral atom and first ion, respectively |

In a recent note Yen[1] has studied the Rayleigh flow of a partially ionized gas and concluded that "choking at Mach number equal to 1" cannot be obtained. The purpose of the present note is to demonstrate the incorrectness of the basic equations, and the conclusion, of Yen.

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