LETTERS TO THE EDITOR

Comment on the Determination of C_p/C_v

In a previous note,[1] a variation on the oscillating-column method of determining γ suitable for the introductory laboratory was suggested. This author has since utilized the method and recommends an alternate statement of the problem and interpretation of the results. The student is confronted with two alternate theories describing the behavior of the oscillating gas. If the confined gas is assumed to undergo isothermal change then

$$\omega_1^2 - \omega_2^2 = p A^2/m V,$$

where ω_1 is the angular frequency of the isothermal oscillation, ω_2 is the angular frequency of the free oscillation, p is atmospheric pressure, A the U-tube cross-sectional area, m the mass of the oscillating water, and V the volume of the trapped gas. However, if the gas is assumed to undergo adiabatic changes, then

$$\omega_1^2 - \omega_2^2 = \gamma p A^2/m V,$$

where ω_1 is now the angular frequency of the adiabatic oscillation. The theory most closely approximating the experimental conditions can then be selected on the basis of careful measurements of ω_1, ω_2, p, A, m, and V.

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1 I. Lerner, Am. J. Phys. **35**, xiv (April 1967).

Boltzmann's "Eta Theorem": Where's the Evidence?

Does the H in Boltzmann's H theorem stand for the eighth letter of the Roman alphabet, or is it supposed to be a capital Greek *eta*?

In 1937, Sydney Chapman published a letter in *Nature* which read (in part) as follows:

> When Boltzmann first published the celebrated theorem now generally known as the H-theorem, he used the symbol E (presumably as the first letter of *entropy*), not H. It has been suggested that when H was first used for this theorem it was intended to be the capital Greek letter *eta*: but the first paper known to me in which H is used for Boltzmann's entropy function is one by Burbury [Phil. Mag. **30**, 301 (1890)] who seems to have changed Boltzmann's symbol E to H for no special reason. Boltzmann himself wrote E so late as 1893 but in 1895 he used the letter H. This use of H must have seemed mysterious to many generations of students, and it would be interesting to know whether any reader can account for its use or give an earlier instance of it.1

Professor Chapman informed me, a couple of years ago, that he never received any response to this letter. However, the "eta" story has persisted among physicists, and I frequently encounter it when speaking or writing about the H theorem.

In the interests of settling the question once and for all (if that is possible), I now challenge all readers of this JOURNAL to produce documentary evidence showing that H in "Boltzmann's H theorem" should be capital eta. Presumably, this would have to be a published article, or an unpublished manuscript or letter, dating from the two decades before Boltzmann's death in 1906. I will gladly send, to the first person who shows me such evidence, a free copy of the volume containing my translation of Boltzmann's paper on the H theorem and subsequent discussion of the reversibility and recurrence paradoxes.[2]

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1 S. Chapman, Nature **139**, 931 (1937).
2 S. G. Brush, *Kinetic Theory, Volume 2. Irreversible Processes* (Pergamon Press, Inc., New York, 1966).

Comment on "Special Relativity without the Postulate of Constancy of Light"

In his note "Special Relativity without the Postulate of Constancy of Light," Mitvalsky[1] refers to a paper of mine[2] and claims "that the mathematical formalism of that paper admits of a simpler basis." He then offers two derivations of the Lorentz-transformation equations that are based, presumably, on assumptions simpler than my use of the observed fact that mass is an increasing function of speed. It is the purpose of this letter to demonstrate that (a) in the absence of an *a priori* commitment to the Lorentz transformation, there are "nonrelativistic" assumptions at least as reasonable as a critical assumption used by Mitvalsky in his first derivation; and (b) his second (purported) derivation is not a derivation but can at best be considered incomplete. A correction and completion of the second approach are offered.

(a) Mitvalsky considers a ball moving "along the y direction with a velocity u" and rotating "about its axis with a period τ." He considers the same ball as observed from "a primed system which is moving with velocity v in the negative x direction relative to the unprimed system." To the usual linearity and symmetry postulates he explicitly adds the crucial assumption that the period of rotation as observed in a given system is a function of the ball's speed as measured in that system. Furthermore, in order to achieve the Lorentz-transformation equations from the relation he derives, he *must* make the additional assumption (or an equivalent one) that the period is an *increasing* function of the speed[3]—a fact he fails to mention.