We believe adequate description of the airship configuration and its physical and aerodynamic properties have been provided in this paper and in its cited references. The aerodynamic estimation techniques used here are based on both analytical and test data of past airship designs which are proprietary. We regret any inconvenience this may cause Mr. Lowe in his independent checking. It is felt that the estimation techniques available in the open literature augmented with good engineering judgement would help in such an endeavor.

Finally, it is observed that one should be familiar with airship flight dynamics and operational practice in airship ground handling in order to readily appreciate the results presented here. For the novice, we suggest a careful review of this paper and its references as a first step in this regard. Although we welcome our peers to check our results independently, one has much more to accomplish by pursuing further studies, indicated in the concluding remarks section of the paper.

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Comment on "Apparent-Mass Coefficients for Isosceles Triangles and Cross Sections Formed by Two Circles"

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IT was a pleasure to read Huang and Chow's[1] elegant paper and learn that such fundamental work is still being funded by the Air Force. But I have a problem with their Fig. 13, the curve from which is replicated in my Fig. 1, together with Taylor's[2] result for a rhomboid. One would expect the two curves to be very similar, and yet they are not.

There is little doubt that Taylor's relationship is correct. Without knowing he had published (we may admit to regarding the British *Philosophical Magazine* as being obscure in Berlin, Moscow, or Boston), the analysis was repeated by Wagner,[3] Sedov,[4] Monaghan,[5] and Bisplinghoff and Doherty,[6] all getting the correct result. (Ferdinande[7] was less fortunate.) And as implied by Fig. 2, abstracted from Payne,[8] all comparisons with experiment made so far have given excellent agreement.

An example of two different wedge shapes, abstracted from Yim,[9] is given in Fig. 3. This is the sort of fairly close agreement that would be expected in the Fig. 1 presentation, but is not found. Indeed, increasing the deadrise from $\theta = 0$ to 20 deg gives a 15% *increase* in added mass, according to Huang and Chow, rather than the roughly 11% reduction with which most naval architects are familiar. Perhaps the authors will find an error if they check their analysis for this case. I hasten to add that the other cases I checked, at known limits, were correct, and that the authors have made a valuable contribution to our knowledge.

I would also like to correct the record on the origins of slender-body theory, which, the authors say, "was suggested by Jones,[10] generalized by Bryson,[11] and later summarized by Nielsen.[12]" As an airplane designer[13] turned naval architect,[14]

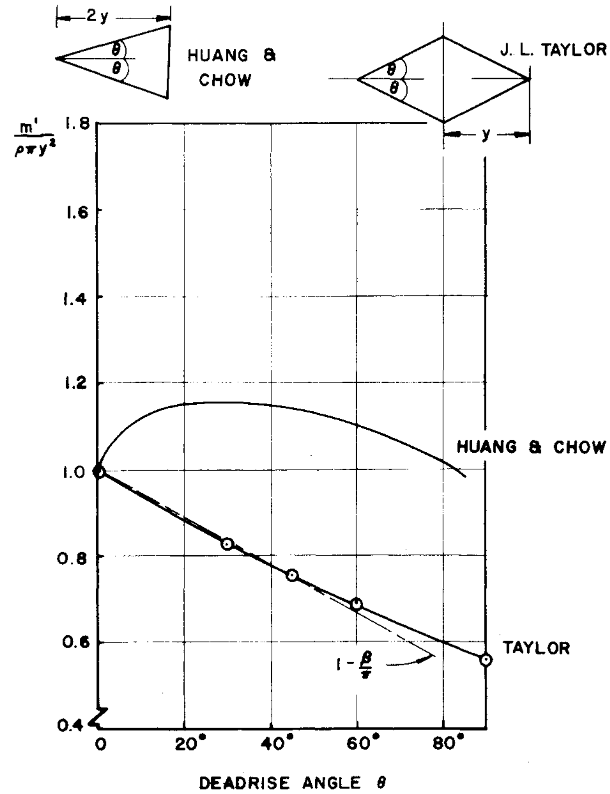

Fig. 1 Huang and Chow's isosceles triangle added mass compared with that of Taylor's rhomboid.

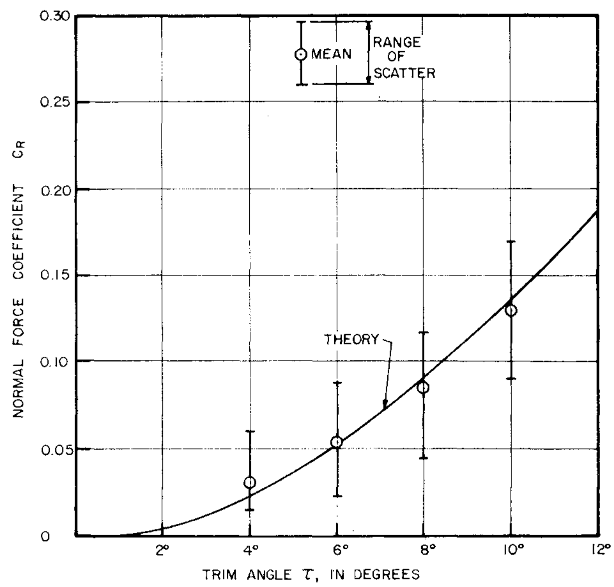

Fig. 2 Shoemaker's[37] dry chine data for a deadrise angle of $\beta = 30$ deg compared with virtual mass theory.

I will admit that aerodynamics is generally ahead of hydrodynamics, but not always. Jones pays tribute to Munk's much earlier paper[15] as being the first publication of what we call today "slender-body theory" in aeronautics and "virtual mass theory" in hydrodynamics, even though it ought to be "added mass." Then, perhaps unknown to Jones, von Kármán[16] proposed its use in connection with calculating the landing impact of seaplanes. Subsequent contributions to the virtual mass theory of planing were made by Pabst,[17] Wagner,[3] and Kreps[18] before the war, and of course many others afterward. Payne[19] has reviewed those which apply to the vertical impact of a wedge. And, in a series of subsequent

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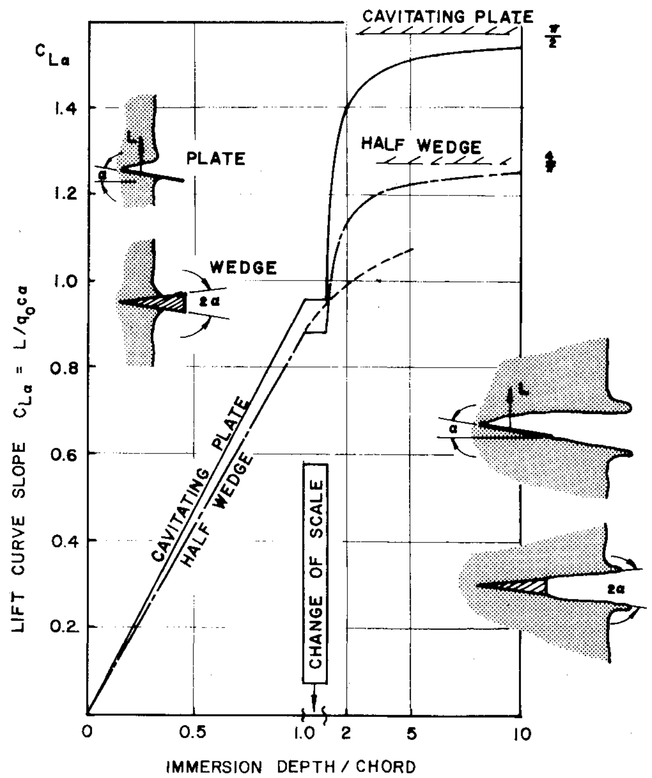

Fig. 3 Comparison between Yim's[9] results for a penetrating flat plate and one surface of a penetrating wedge.

papers,[8,20-29] he has developed the virtual mass theory of planing to the point where, in most cases, it is more accurate than experiment, as Fig. 2 attests. And particularly germane to the present criticism, in Ref. 27 he showed that the force on a flat-plate planing at a trim angle τ can be deduced from the force on one side of a vertically impacting wedge, whose deadrise angle $\beta = \tau$; suggesting that the interaction between adjacent surfaces is very small.

In the aeronautical disciplines there have been so many contributions to slender-body theory that it is almost invidious to single out the most eminent. But certainly no list could exclude the important contributions of Laitone,[30] Neumark,[31] Adams and Sears,[32] and Ward.[33]

Researchers in the water entry of weapons have also employed virtual mass concepts with considerable success. Notable early work was done by Shiffman and Spencer.[34,35] An excellent modern review is provided by May et al. in Chap. 2 of Ref. 36. But, like some of their aeronautical counterparts, they seem to have been unaware of work in the other two fields.

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