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CORRIGENDUM

On wave-driven propulsion – CORRIGENDUM

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1. Corrigendum

Upon more detailed inspection, figure 4 in our paper (Benham, Devauchelle & Thomson 2024) did not provide a consistent direct comparison between the present simulation work and the predictions of Longuet-Higgins & Stewart from 1964 (associated Ref. is displayed in our paper). The analysis of Longuet-Higgins & Stewart is summarized and applied in follow-up work from 1977, and provides a quantitative prediction for the force (per unit width) associated with deep-water gravity waves on a floating body as

$$F = \tfrac{1}{4}\rho g [A^2]_{x=\ell}^{x=-\ell}. \tag{1.1}$$

As such, a difference in the amplitude of the fore and aft wave emission will lead to a net wave thrust (see Ref's by Rhee *et al.* (2022) and Ho *et al.* (2023) in our paper). When one substitutes the dispersion relation for deep-water gravity waves ($\omega^2 = gk$), this can be seen to be consistent with the 'Longuet-Higgins scaling' in the original publication (Benham *et al.* 2024, Eq. (C16)), apart from the prefactor. This classical prediction is derived from first principles and goes beyond scaling, and thus provides an exact prefactor associated with the result allowing for a more direct quantitative comparison. Furthermore, the simulations underlying the original figure 4 were not in fact all conducted in the deep-water limit (i.e. $kH \gg 1$) as stated. When the simulations are repeated while respecting this limit (specifically $kH = 4$ is sufficient), the exact prediction of Longuet-Higgins is nearly indistinguishable from the present numerical predictions as shown in figure 1 below. Henceforth, we replace figure 4 from the original paper with figure 1 herein.

This new successful comparison in figure 1 suggests that the simple expressions derived in prior work by Longuet-Higgins & Stewart (see Ref. from 1964) are appropriate for application to wave-driven propulsion, provided one operates within the assumptions of the theory. Note that Longuet-Higgins & Stewart derive and provide analogous predictions to (1.1) for the more general case of capillary-gravity waves in finite depth. To the best of our knowledge, while these results have been applied to *estimate* wave-driven propulsive forces in several experiments (e.g. see Ref's by Pucci (2015), Roh & Gharib (2019),

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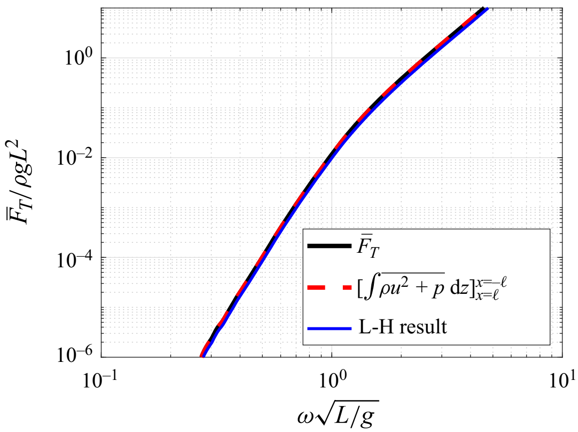

Figure 1. Comparison between the numerically calculated thrust $\bar{F}_T$ and momentum flux across the domain showing close agreement between the two as well as close agreement with the prediction of Longuet-Higgins (1964) for the case of deep-water gravity waves. Surface tension and viscosity are neglected for the purpose of these calculations, with $kH = 4$ and 500×500 gridpoints in the simulations.

Rhee *et al.* (2022), Ho *et al.* (2023), Barotta *et al.* (2023) in our paper), direct force measurements have not been completed in this context that would likely provide additional clarity to the numerous remaining subtleties in this rich problem.

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Reference

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