

## Correspondence

DEAR EDITOR,

In my article [1], the wave is assumed to be travelling in deep water, meaning that the depth  $h$  and wavelength  $\lambda$  are such that  $h/\lambda$  is large. If this restriction is abandoned, in the notation used in the article the velocity components of a water particle with mean position  $(\bar{x}, \bar{y})$  are (Ramsay [2])

$$\dot{x} = an \frac{\cosh m(\bar{y} + h)}{\sinh mh} \sin(m\bar{x} - nt),$$

$$\dot{y} = -an \frac{\sinh m(\bar{y} + h)}{\cosh mh} \cos(m\bar{x} - nt).$$

At and below a wave crest,  $\dot{y} = 0$ ,  $\cos(m\bar{x} - nt) = 0$ ,  $\sin(m\bar{x} - nt) = 1$ , and

$$\dot{x} = an \frac{\cosh m(\bar{y} + h)}{\sinh mh}.$$

From the surface to the depth  $h$  beneath a crest, the rate of forward transport of water volume (per unit length normal to the plane  $Oxy$ ) is

$$\begin{aligned} \dot{V} &= \int_{-h}^0 \dot{x} d\bar{y} = \frac{an}{\sinh mh} \int_{-h}^0 \cosh m(\bar{y} + h) d\bar{y} \\ &= \frac{an}{\sinh mh} \left[ \frac{1}{m} \sinh m(\bar{y} + h) \right]_{-h}^0 \\ &= \frac{an}{m}. \end{aligned}$$

This is the same value as for deep water, which is not surprising because continuity of rate of transport of mass requires it.

Yours sincerely,

MAURICE N. BREARLEY

85 Dandarriga Drive, Clifton Springs, Victoria, Australia 3222

### References

1. Maurice N. Brearley, About tsunamis, *Math. Gaz.* **89** (November 2005), pp. 437-440.
2. A.S. Ramsey, *A treatise on hydromechanics*, Part II, Bell (1960).

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