

LETTER TO THE EDITOR

Some experimental observations of upstream disturbances in a two-fluid system

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This is in reference to Professor Long's recent article in *Tellus* (1974). His inability to produce internal drops had led him to make the suggestion that it "may have something to do with the seeming irrelevance of the theory to cases in which the lower fluid is deeper than the upper fluid". This statement is true, only in a very restricted sense, since consideration of the same problem, only now with the obstacle jutting from the roof into the flow, would lead to a resolution of this difficulty. One of the most beautiful properties of internal jumps and drops is their symmetry, which is perfect in the Boussinesq limit. Thus, an internal drop is the mirror reflection about a central horizontal plane of the internal jump. This property, first

conceived intuitively, has been mathematically proven by the writer (1973*a*). The "natural" situation, therefore, for producing an internal drop is when an obstacle is jutting into the flow from the roof just as, for an internal jump, it is when the obstacle is on the floor. The writer has done extensive experimentation with fixed obstacles and arbitrary shear between the flowing layers, and has had no difficulty in creating internal jumps or drops. Some photographs of these are included in the writer's dissertation (1973*a*).

Finally, one of the "unpublished" manuscripts and the paper by the writer and Professor Kelly referred to by Professor Long have since been published in *Tellus* (1973*b*, 1973).

REFERENCES

- Long, R. R. 1974. Some experimental observations of upstream disturbances in a two-fluid system. *Tellus* 26, 313.
- Mehrotra, S. C. 1973*a*. Internal hydraulic jumps and drops in a two-fluid system. Ph.D. dissertation, University of California at Los Angeles.
- Mehrotra, S. C. 1973*b*. Limitations on the existence of shock solutions in a two-fluid system. *Tellus* 25, 169.
- Mehrotra, S. C. & Kelly, R. E. 1973. On the question of non-uniqueness of internal hydraulic jumps and drops in a two-fluid system. *Tellus* 25, 560.