

## SLOPE CORRECTIONS FOR ECHO SOUNDINGS (\*)

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In continuation of the articles already published on this subject in the *Hydrographic Review*, the International Hydrographic Bureau has received a communication containing interesting remarks from Mr. FLORISSON, which the Bureau considers advantageous to put before the readers of the *Hydrographic Review*. Consequently, authorisation was requested to publish the two papers which are given below, together with the correspondence and an extract from the discussion which took place at a meeting of the *Association Technique Maritime et Aéronautique*, Paris.

The following letter was received from Mr. FLORISSON :

*(Translated from the French)*

Courbevoie, 13th January 1931.

Sir,

I follow with much interest the discussions now appearing in the *Hydrographic Review* on the subject of the errors in Echo-Sounding on steeply inclined bottoms.

In the very interesting article by Ingénieur-Hydrographe Général P. DE VANSAY DE BLAVOUS, entitled *Slope Corrections for Echo Soundings* (*Hydrographic Review*, Vol. VII, No 2), it seems to me that the eminent author attributes the same error to ultra-sonic soundings as to sonic soundings (according to him ultra-sonic appliances give the shortest distance to the bottom and not a vertical sounding).

I venture to point out that this is true only when use is made of an ultra-sonic appliance which is not properly adjusted, *i.e.* when the emission is too strong and the reception too delicate. Under these circumstances it is a fact that the beginning of the echo recorded by the oscillograph corresponds to marginal rays of the cone of emission, and these rays may lie as far as about  $12^{\circ}$  from the vertical axis of the cone. However, it is easy to observe such imperfect adjustment of the apparatus when making the abstract from the recording band (for in these circumstances the  $V$  caused by the echo is prolonged in time) and to take it into account when deducing the soundings therefrom, in other words to correct the error. This is done by reading the depth from the middle of the  $V$  and not from the point where it begins.

When an ultra sonic apparatus is correctly adjusted, *i.e.* if the minimum power of emission and sensitiveness of reception compatible with satisfactory recording of the echo ( $V$  narrow in time) be used, *half of the angle at the vertex of the cone of emission is certainly less than  $6^{\circ}$* , hence the apparatus records practically a vertical sounding.

As material proof of my contention I put forward the pieces of records and the arguments which I quoted during the discussion of the memorandum by Ingénieur Hydrographe MARTI at the 1930 meeting of the Association Technique Maritime et Aéronautique.

I venture to enclose an extract which gives this memorandum and discussion.

I have the honour, etc...

*(Signed)* : C. FLORISSON.

P.S. — I take this opportunity of forwarding an extract which contains the communication made by Professor LANGEVIN to the Association in 1929, which is a very valuable contribution to the theory of submarine acoustics.

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(\*) See *Hydrographic Review*, Vol. V, No 1, May 1928; Vol. VII, No 1, May 1930 Vol. VII, No 2, November 1930.

To this the following reply was sent :

*(Translated from the French)*

2nd February 1931.

N° I.H.B. 298/31-78/14.

Sir,

I thank you for your very interesting letter of the 13th of January, and for the communications made by Messrs. LANGEVIN and MARTI which you kindly enclosed with it.

The Directing Committee of the International Hydrographic Bureau is very anxious to publish your letter, and these two communications, in its Review. It requests you, therefore, to authorise the publication of the letter and it is writing directly to the Association Technique Maritime et Aéronautique for authority for the rest, but it would be glad if you would kindly support this application to this Association, and to the authors, in order to obtain the necessary permission.

As to my article entitled *Slope Corrections for Echo Soundings*, which appeared in the November 1930 number of the *Hydrographic Review*, I must state that I never had any intention to take part in discussion of the question as to the direction followed by sonic rays in ultra sonic soundings. I stated on page 50 that the use of vibrating plates, and I was considering particularly quartz plates, must produce a cone of sonic rays of a certain width. Though I dealt with records of sounding by ultra sounds (in figures 8, 9, and 10) as providing a record of the shortest distance to the bottom, it was only by way of applying the method which I was suggesting if the case where the hypothesis that the reflection comes from the nearest point of the bottom be true, but nevertheless without stating that the hypothesis is true.

I am very glad, however, to have this opportunity of once more stating the necessity of ascertaining whether the method of sounding used gives a measure of the vertical sounding or the measure of the distance at right angles to the bottom, for if slope corrections are applied in the case of a method which gives vertical soundings, when such corrections are not applicable, this comes to the same thing as assuming the true surface of the bottom, as given by the soundings uncorrected for slope, as being that which I called the apparent bottom surface, and that instead of it a surface be taken which would be entirely below it; this, it seems, might not be without disadvantages.

I have the honour to be, etc...

*(Signed)* : P. DE VANSSAY,  
*President of the Directing Committee.*

The "Note on Acoustic Sounding" by M. MARTI and the paper "On the ultra sonic Mirage" by Prof. LANGEVIN are reproduced below.

