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THE DETERMINATION OF THE HARMONIC CONSTANTS FROM TIDAL OBSERVATIONS MADE IN DANMARKS HAVN

($\varphi = 76°46',2\,\mathrm{N}$; $\lambda = 18°46'\,\mathrm{W}$)

BY

J. EGEDAL

KØBENHAVN
C. A. REITZELS FORLAG
BIANCO LUNOS BOGTRYKKERI A/S
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During the Danmark Expedition to the north-east coast of Greenland tidal observations were made in Danmarks Havn from Oct. 3, 1906, to March 2, 1907, by ALF TROLLE and H. A. Ø. BISTRUP. The observations and the results from a determination of the non-harmonic constants have been published by H. A. Ø. BISTRUP[1]). The results from a determination of the harmonic tidal constants derived from the observations from Jan. 3—March 1, 1907, will be given below.

The tidal observations are carried out in a special manner and therefore the question of the certainty of the observations has been closely considered. It has been stated that the recorded values for a few short intervals are incorrect, but generally the standard deviation of the observations does not exceed 2 centimetres. For the intervals where the observations are incorrect it has always been possible to obtain values by graphical interpolation. Nothing definite can be said with regard to the constancy of the point of reference of the measurement for the whole period, but a possible lack in constancy would certainly not be so great as to affect appreciably the present determination.

In order to obtain values for full hours (mean solar time) it has been necessary to use graphical interpolation for the period Jan. 3—21, but from Jan. 21 to March 1 the hourly values are found by numerical interpolation when necessary.

The obtained hourly values of the height of the sea level for the periods from Jan. 3—31, 1907, and Febr. 1—March 1, 1907, have been analysed according to the method of A. T. DOODSON[2]). The terms M_2, S_2, N_2, K_2, K_1, O_1, P_1, M_4 and MS_4 have been computed. The results of these computations for the two periods and for the whole period are given in Table 1. The quantity A_0 is referred to

[1]) H. A. Ø. BISTRUP: Tidal observations in Danmarks Havn Oct. 3, 1906—March 2, 1907. Medd. om Grønl. Vol. 41, p. 422—455.

[2]) Instruction for analysing tidal observations. Published by order of the Lords Commissioners of the Admirality, London.

the bottom of the sea at the place of observation and not as usual to the chart datum.

Table 1. Harmonic tidal constants.

Danmarks Havn, S = +1. φ = 76°46′N; λ = 18°46′W.

	A_0	M_2			S_2			N_2			K_2		
	cm	cm	ϰ	g	cm	ϰ	g	cm	ϰ	g	cm	ϰ	g
1907 Jan. 3—31	710.0	50.8	307°	316°	18.4	352°	000°	10.4	275°	284°	5.0	353°	000°
Febr. 1—March 1	714.1	50.7	307	316	19.2	350	358	10.7	273	282	5.2	351	358
Jan. 3—March 1	712.0	50.8	307	316	18.8	351	359	10.5	274	283	5.1	352	359

(continued)

K_1			O_1			P_1			M_4			MS_4		
cm	ϰ	g	cm	ϰ	g	cm	ϰ	g	cm	ϰ	g	cm	ϰ	g
7.5	45°	49°	6.2	11°	16°	2.5	45°	49°	1.7	147°	154°	1.0	229°	245°
9.3	41	45	6.5	7	12	3.1	41	45	0.9	140	147	1.0	255	271
8.4	43	47	6.3	9	14	2.8	43	47	1.3	144	151	1.0	242	258

Table 2. Harmonic tidal constants for Danmarks Havn.

	M_2		S_2		N_2		K_2	
	H cm	ϰ	H cm	ϰ	H cm	ϰ	H cm	ϰ
Danmarks Havn 76°46′ N 18°46′ W	50.8	307°	18.8	351°	10.5	274°	5.1	352°

(continued).

K_1		O_1		P_1		M_4		MS_4		Time and duration of observations
H cm	ϰ	H cm	ϰ	H cm	ϰ	H cm	ϰ	H cm	ϰ	
8.4	43°	6.3	9°	2.8	43°	1.3	144°	1.0	242°	1907 58 days

(continued).

Authority		Published
Observations	Analysis	
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From Table 1 it will be seen that the constants derived for the two periods agree so closely with each other that the certainty of the constants may be considered satisfactory.

In order to have all the necessary information in connection with the tidal constants for Danmarks Havn in a collected form, a table corresponding to Table 4 in Medd. om Grønl. Vol. 107, No. 2, p. 34 is given above.

Comparing the tidal constants of Table 2 with those of the above mentioned Table 4 it will be seen that there is a satisfactory agreement between the values for Danmarks Havn and those for the stations lying near Danmarks Havn.

By the present determination of tidal constants the greatest gap between the coast-stations of Greenland, for which tidal constants have already been determined, has been diminished.

The computations have been carried out at the Geophysical Section of the Danish Meteorological Institute with the assistance of Miss ELLEN HONUM.

The present paper has been prepared at the Danish Meteorological Institute at the request of H. A. Ø. BISTRUP, commodore of the second class R. D. N.

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