
HARMONIC CONSTANTS
Annex A

Edition 1.0

1. Introduction

1.1 General

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1. Introduction

1.1 General

The following documentation gives a brief explanation of the most commonly used Harmonic constituents.

1.2 Major Tidal Constituents Lunar

M_2	The semi-diurnal constituent of a fictitious moon, which moves in a circular orbit in the plane of the equator
N_2 & L_2	Modulate M_2 , converting the circular orbit of the fictitious moon into an elliptical one in the plane of the equator
ν_2, λ_2, μ_2 & S_2	Modulate M_2 , allowing for the fact that the real moon's orbit is not elliptical, but pear shaped, since the sun attracts it more at new moon than at full moon. This S_2 is not the main semi-diurnal constituent of the mean sun.
K_2	Modulates M_2 , converting the orbit from the plane of the equator into the mean plane of the real moon.
K_1 & O_1	The diurnal constituents of a fictitious moon which has a fixed circular orbit in the mean plane of the real moon
J_1, M_1 & Q_1	Modulate K_1 & O_1 , allowing for the fact that the moon's orbit is not circular, but elliptical. M_1 is the sum of two constituents, which cannot easily be separated.
M_f & M_m	'Long Period' lunar constituents, with periods of about a fortnight and one month respectively. They have very small amplitudes, and are often masked by meteorological and shallow water effects.

1.3 Major Tidal Constituents Solar

S_2	The semi-diurnal constituent of the mean sun, which moves in a circular orbit in the plane of the equator
T_2	Modulates S_2 allowing for the fact that the sun's orbit is an ellipse. Another constituent, which operates with T_2 , is so small that it is not named and is neglected.

Description of Harmonic Constituents

K_2	Modulates S_2 , allowing for the fact that the sun's orbit is in the plane of the ecliptic. Another constituent, which operates with it, is so small that it is not named and is neglected. This K_2 has the same speed as the moon's K_2 , and the two are combined.
K_1 & P_1	The diurnal constituents of a fictitious sun which has a circular orbit in the plane of the ecliptic. This K_1 has the same speed as the moon's K_1 , and the two are combined.
S_{sa} & S_a	'Long Period' solar constituents, with periods of about six months and one year respectively. They have very small amplitudes, and in practice cannot usually be distinguished from changes in MSL caused by prevailing winds and monsoons.

1.4 Major Tidal Constituents Shallow Water

M_4	The second harmonic of M_2 with twice its speed.
MS_4	A quarter diurnal constituent produced from M_2 & S_2 . It has a speed equal to the sum of their two speeds.
M_6	The third harmonic of M_2 with three times its speed.
$2MS_6$	A sixth diurnal constituent produced from M_2 and S_2 . It has a speed equal to the sum of twice the speed of M_2 plus the speed of S_2 .

There are of course many other shallow water constituents with high harmonic frequencies, as shown in Annex B.