Fig. 107. Centrifugal forces when a body $M$ rotates around $M^*$. 
FIG. 108. Determination of intensity and direction of the tide generating forces resulting from the difference between attractive and centrifugal forces. ——>, open arrows: attractive forces; ——>, hatched arrows: centrifugal forces; ——>, black arrows: tide generating forces.
Fig. 111. Left: distribution of the horizontal component of the tide generating force when the moon is in the equator. Right: same when the moon has a positive declination of 28°N.
Fig. 2.3 — (a) Distribution of tide-generating force around the earth. (b) The equilibrium tide due to the moon. A given point experiences two high waters, e.g. at $P$ and $P'$, in a lunar day as the earth rotates on its axis.
Fig. 0.12. Spring and neap tides at Pointe au Père, Quebec (48° 31' N, 68° 28' W), during the month of April 1965. The vertical scale gives the water levels in feet.

Fig. 0.13. The mixed tide at Victoria, British Columbia (48° 26' N, 123° 20' W), during the month of April 1965.
The first tide-predicting machine was designed by Sir William Thomson (Lord Kelvin) and made in 1873 for the British Association for the Advancement of Science. This machine computed the height of the tide using
\[ h = H_o + \sum f H \cos(at + (V_o+u) - K) \]
It summed 10 of the principal constituents. The predicted heights were registered by a curve automatically traced by the machine.

The terms of the equation are defined as follows:

- \( h \) = height of tide at any time \( t \)
- \( H_o \) = mean height of water level above datum used for prediction.
- \( H \) = mean amplitude of any constituent \( A \).
- \( f \) = factor for reducing mean amplitude \( H \) to year of prediction.
- \( a \) = speed of constituent \( A \).
- \( t \) = time reckoned from some initial epoch such as beginning of year of predictions.
- \( (V_o+u) \) = value of equilibrium argument of constituent \( A \) when \( t = 0 \).
- \( K \) = epoch of constituent \( A \).

http://co-ops.nos.noaa.gov/predmach.html
United States Coast and Geodetic Survey tide-predicting machine No. 2
Figure 1.6.3. The pneumatic or bubbler gauge. This system links changes in the hydrostatic pressure, $P_m$, at the outlet point of the bubbles to variations in sea-level, $h_m$, water density and atmospheric pressure, $P_a$. 

$P_m = \rho gh_m + P_a$
NIWA sea level recording site, Anawhata, west coast New Zealand.