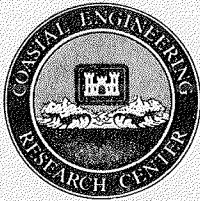


Coastal Engineering Technical Note



COMPUTER PROGRAM: SHALWAVE (MACE-10)
SHALLOW WATER WAVE FORECASTING

PROGRAM PURPOSE: This program takes water depth, fetch length, and wind stress factor (an option is offered to adjust the measured windspeed if wind stress factor is not available) and estimates the spectrally based significant wave height, the peak spectral wave period, and the minimum wind duration to reach this condition for waves generated in shallow water.

PROGRAM CAPABILITY: This program is written in Microsoft BASIC and produces a tabular printout of the spectrally based wave height, wave period, and minimum wind duration. The program accepts English or metric system units.

PROGRAM APPLICATION: For fetches with predominant depths less than half the equivalent deepwater wavelength generated by a given set of wind conditions, the wave growth will be affected by interaction with the sea floor. Deepwater forecasting techniques should not be used. SHALWAVE applies the shallow water forecasting equations described in Chapter 3 of the Shore Protection Manual (USAE, 1984). Determination of fetch is of particular importance to the reliability of the computations, which assume the guidance for fetch determination in the Shore Protection Manual has been followed. The program includes an option to adjust a measured windspeed to an equivalent overwater wind stress factor required by the wave forecasting relations, but does not account for directional spreading of wave energy. The program also does not account for refraction and shoaling of waves into water shallower than the specified predominant depth, which is assumed to be constant along the fetch. The forecast wave heights are conservatively high if the actual wind duration is less than the minimum estimated by the program.

PROGRAM AVAILABILITY: The program is available for the IBM PC on a 5 1/4-in. diskette or as a printed program listing and may be obtained from

Ms. Gloria J. Naylor at (601) 634-2581 (FTS 542-2581), Engineering Computer Programs Library Section, Technical Information Center, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, Mississippi 39180-0631. Questions concerning the application of SHALWAVE can be directed to Mr. Orson P. Smith at 601-634-2013 (FTS 542-2013), or Mr. Doyle L. Jones at 601-634-2069 (FTS 542-2069) both of the Coastal Design Branch.

INPUT:

1. Water depth (assumed constant along the fetch)
2. Fetch length
3. Wind stress factor or measured wind speed

OUTPUT: A table of spectrally based significant wave height, peak spectral wave period, and minimum duration in both English and metric units.

SAMPLE PROBLEM: The fetch length is 80,000 feet with an adjusted windspeed of 50 miles per hour and a constant depth of 35 ft. What are the significant wave height, wave period, and duration?

RUN

SHALLOW WATER WAVE FORECASTING

VERSION 9-85

IS WIND STRESS FACTOR AVAILABLE (Y OR N) ? Y

DO YOU WANT TO SEE INSTRUCTIONS (Y OR N) ? Y

USE MILES/HOUR, METERS/SEC OR KNOTS FOR ADJUSTED WIND SPEED

USE STATUTE MILES, FEET, NAUTICAL MILES

METERS OR KILOMETERS FOR FETCH DISTANCE

USE FEET OR METERS FOR DEPTH

PRESS ANY KEY TO CONTINUE

WIND STRESS FACTOR UNITS

- 1-MILES/HOUR
- 2-METERS/SECOND
- 3-KNOTS

WHICH UNIT ? 1

ENTER WIND STRESS FACTOR ? 50

FETCH UNITS

- 1-STATUTE MILES
- 2-FEET
- 3-NAUTICAL MILES
- 4-METERS
- 5-KILOMETERS

WHICH UNIT ? 2

ENTER FETCH ? 80000

DEPTH UNITS

- 1-FEET
- 2-METERS

DEPTH UNITS (1 OR 2) ? 1

ENTER DEPTH ? 35

1=SCREEN OUTPUT ONLY OR 2=PAPER OUTPUT ONLY ? 1

===== SHALLOW WATER WAVE FORECAST =====

WIND STRESS FACTOR	50.0 MPH	43.5 KNOTS	22.4 M/SEC
FETCH	15.2 MILES	13.2 NAUT MILES	24.4 KM
DEPTH	35.0 FEET		10.7 M

SPECTRALLY BASED SIGNIFICANT WAVE HEIGHT	4.9 FT	1.5 M
PEAK SPECTRAL WAVE PERIOD	4.4 SEC	
MINIMUM WIND DURATION	1.6 HR	

===== MORE CALCULATIONS (Y OR N) ? N =====

REFERENCES:

Shore Protection Manual. 1984. 4th ed., 2 vols, US Army Engineer Waterways Experiment Station, Coastal Engineering Research Center, US Government Printing Office, Washington, DC.