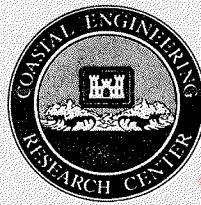




# Coastal Engineering Technical Note



COMPUTER PROGRAM: JONSWAP (MACE-12)  
DEEP WATER WAVE FORECASTING

PROGRAM PURPOSE: This program takes a fetch length ( $F$ ), wind stress factor ( $U_A$ ) (an option is offered to adjust the measured windspeed if wind stress factor is not available), and duration ( $t$ ) as input and calculates the corresponding JONSWAP deepwater spectrally based significant wave height ( $H_{mo}$ ) and the peak spectral period ( $T_p$ ), for fetch-limited, duration-limited, or fully developed seas in deep water. The equations used are presented in the Shore Protection Manual, Table 3-2 (U.S. Army Engineer Waterways Experiment Station 1984), and Vincent (1984).

PROGRAM CAPABILITY: This program is written in Microsoft BASIC and produces a tabular printout of spectrally based significant wave height and peak spectral period for fetch-limited, duration-limited, or fully developed seas in deep water, whichever is appropriate. The program accepts either English or metric units.

PROGRAM APPLICATION: This method is appropriate only if the geometry of the waterbody is relatively simple in shape, pre-existing waves can be ignored and the wave conditions are either fetch-limited, duration-limited or fully developed. The program is suitable for any wave forecasting problem to which the JONSWAP relations apply, as defined by the Shore Protection Manual, (U.S. Army Engineer Waterways Experiment Station 1984) .

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 (601) 634-2581 (FTS 542-2581), Engineering Computer Programs Library Section, Technical Information Center, US Army Engineering Waterways Experiment Station, P.O. Box 631, Vicksburg, Mississippi 39180-0631. Questions concerning the application of the computer program JONSWAP 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. Fetch length (statute miles, nautical miles, meters, or kilometers)
2. Wind stress factor or measured windspeed (miles/hour, meters/second) or knots)
3. Duration of wind (hrs)

OUTPUT: The output is a table of the deepwater spectral wave height and the peak spectral period in both English and metric units. The wave height and period formulae incorporated in JONSWAP will not provide the same results as those from graphs in the Shore Protection Manual (SPM, 1984) or ETL-1110-2-305 for duration limited growth. Wave growth with time is not as well understood or documented as wave growth with fetch. The duration formulae used in the program JONSWAP represent a more current view of basic growth relationships, consistent with other CERC numerical wave prediction models.

SAMPLE PROBLEM: With a fetch of 9.21 statute miles, a wind stress factor of 46.1 miles per hour, and a duration of 20 hours determine (a) if the sea state is (1) fetch-limited, (2) duration-limited, or (3) fully developed and (b) estimate the spectrally based significant wave height ( $H_{mo}$ ) and the peak spectral period ( $T_p$ ).

RUN

JONSWAP DEEPWATER WAVE FORECASTING

VERSION 9-85

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

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

FETCH----STATUTE MILES, FEET, NAUTICAL MILES, METERS, OR KILOMETERS

WIND STRESS FACTOR-MILES/HOUR, KNOTS, OR METERS/SECOND

DURATION--HOURS

PRESS ANY KEY TO CONTINUE

FETCH

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

ENTER FETCH UNIT ? 1

ENTER FETCH DISTANCE ? 9.21

WINDSPEED OR WIND STRESS FACTOR UNITS

1-MILES/HOUR

2-METERS/SECOND

3-KNOTS

WIND STRESS FACTOR UNITS ? 1

ENTER WIND STRESS FACTOR ? 46.1

WIND STRESS FACTOR IS 46.1

ENTER DURATION (HOURS)? 20

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

DEEPWATER WAVE FORECASTING

FETCH	9.2	MILES	8.0	NAUT MILES	14.8	KM
WIND STRESS FACTOR	46.1	MI/HR	40.1	KNOTS	20.6	METERS/SEC
DURATION	20.0	HOURS				

FETCH LIMITED

WAVE HEIGHT	4.2	FT	1.3	M
WAVE PERIOD	4.2	SEC		

MORE DEEPWATER WAVE FORECASTS (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.

Vincent, C. L. 1984. "Deepwater Wind Wave Growth with Fetch and Duration," Miscellaneous Paper CERC-84-, 1984 (in preparation).

Vincent, C. L., and Lockhart, Jr., J. H. 1984. "Determining Sheltered Water Wave Characteristics," ETL 1110-2-305, Coastal Engineering Research Center, Vicksburg, MS, 1984.