OFFSHORE ENGINEERING GRADUATE PROGRAM

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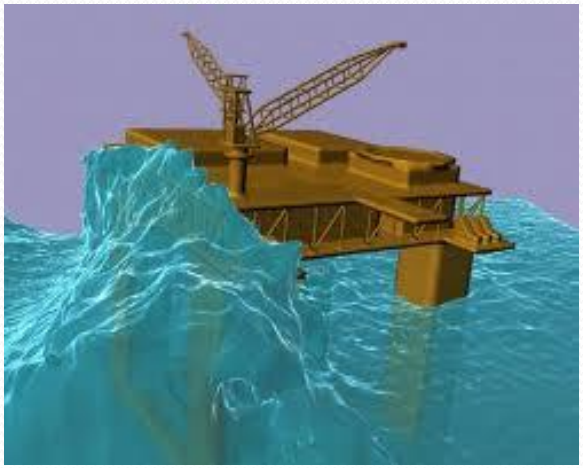
Shipbuilding and Ocean Engineering Program

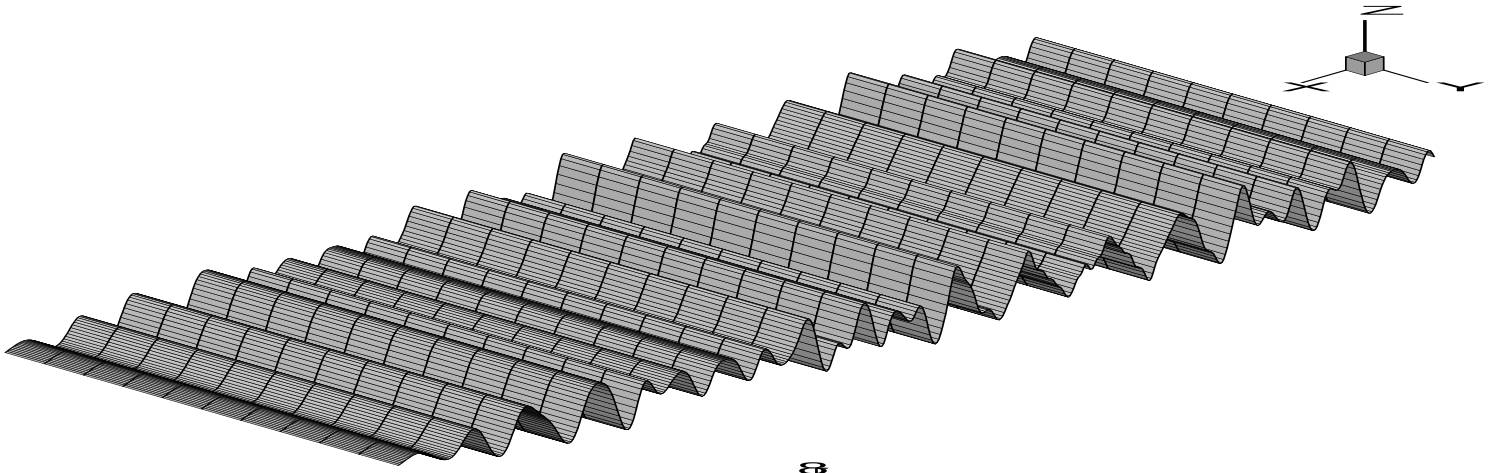
General Aspects:
Hydrodynamic and Structural Analyses

Estimation of wave and current loads in extreme weather conditions and subsequent structural modeling are two important aspects in the design of an offshore platform.



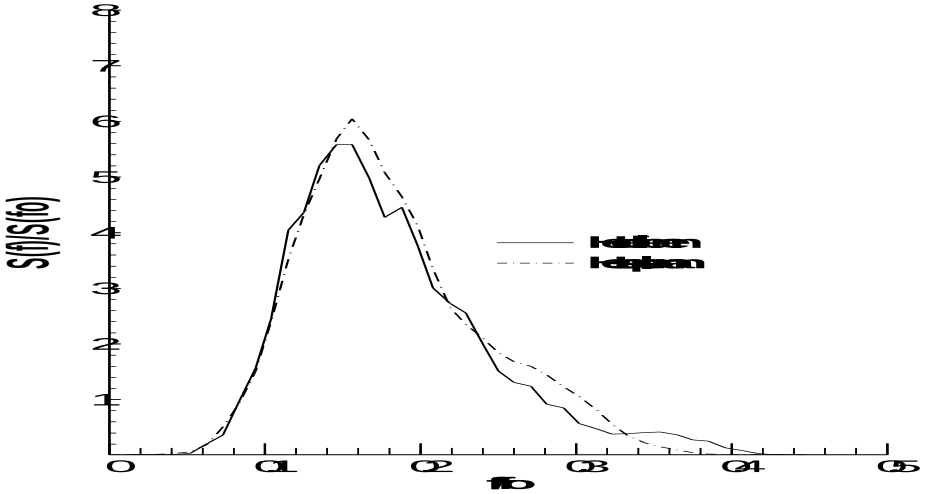
Wave modeling: Internally generated random waves

Not only regular sinusoidal waves but also random waves may be generated internally within the domain according to a given wave spectrum.



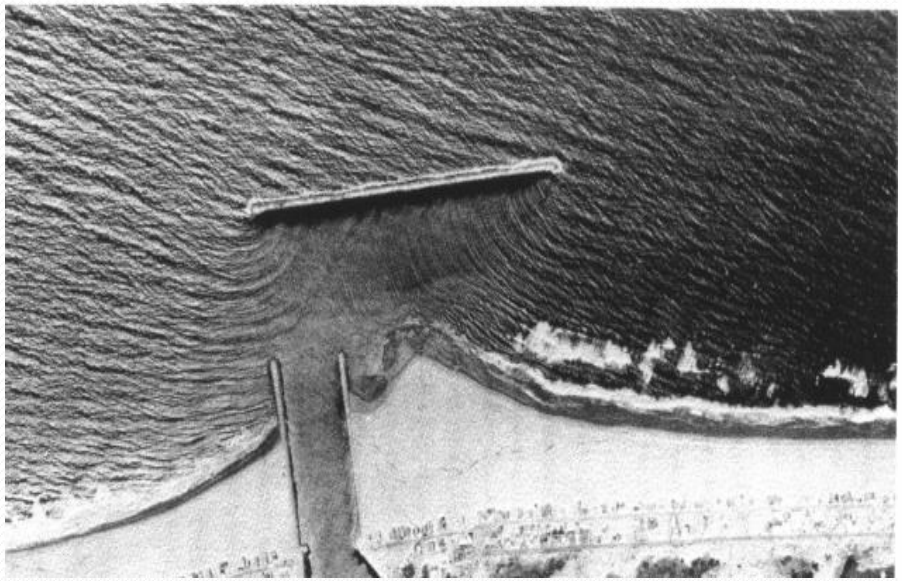
Bretschneider spectrum

$$S(f) = \frac{5H_s^2}{16 f_0} \frac{1}{(f/f_0)^5} e^{-\left[\frac{5}{4}\left(\frac{f}{f_0}\right)^{-4}\right]}$$

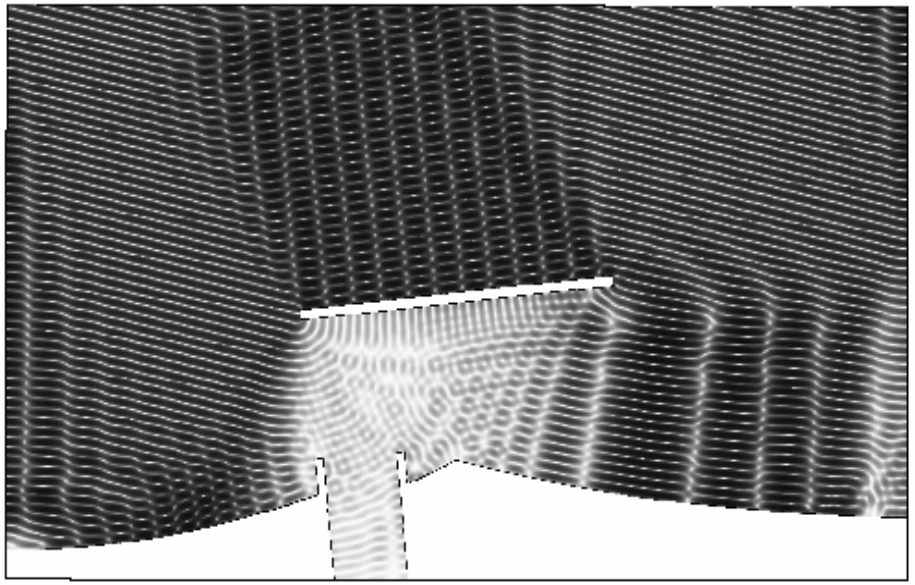


Wave modeling: Wave diffraction at Channel Islands Harbor breakwater, California

Aerial photograph of the actual breakwater

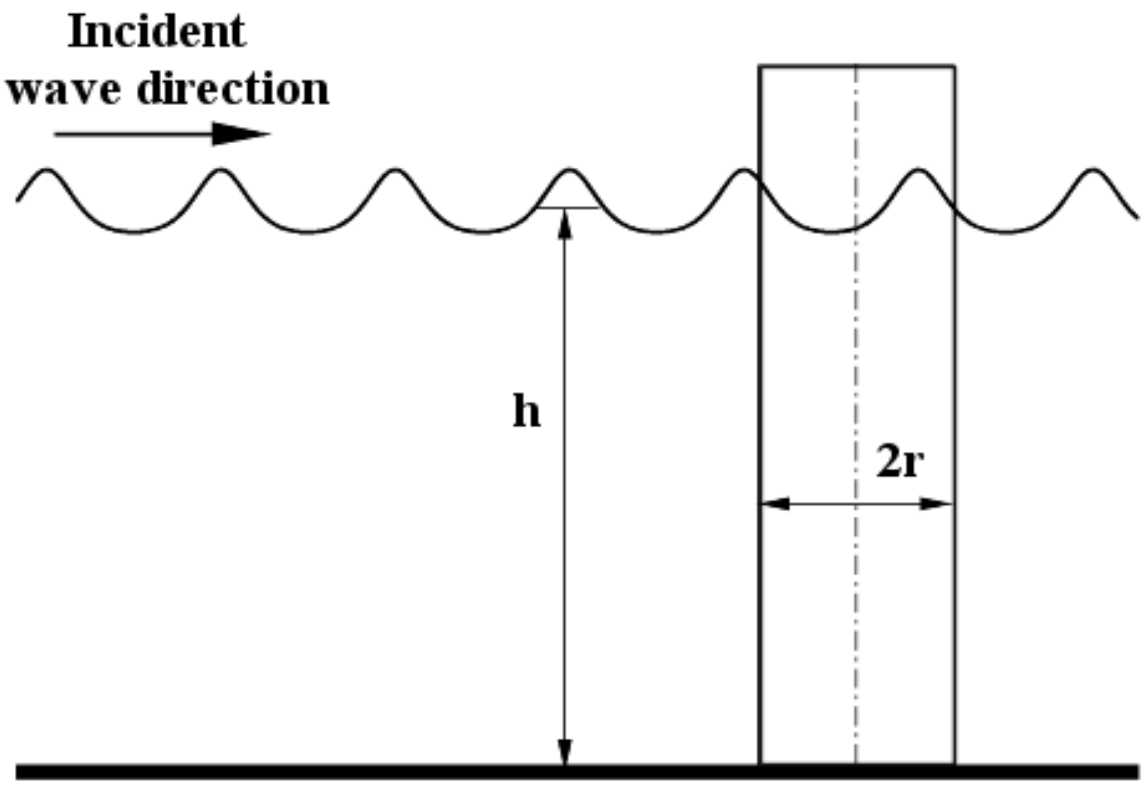


Numerical wave simulation for geometrically similar region



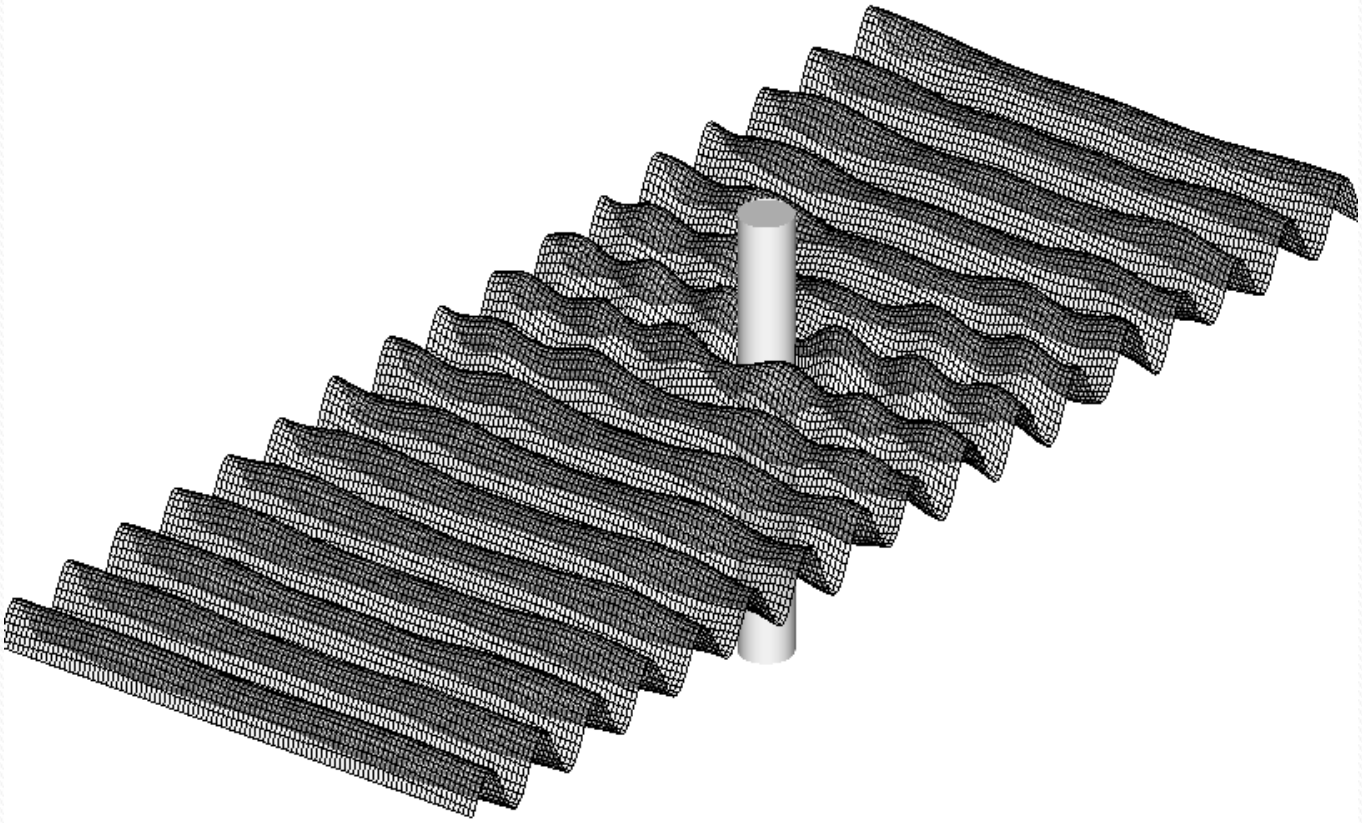
Hydrodynamics: Wave forces acting on bottom-mounted surface-piercing piles

Wave forces acting on cylindrical pile of circular cross-section



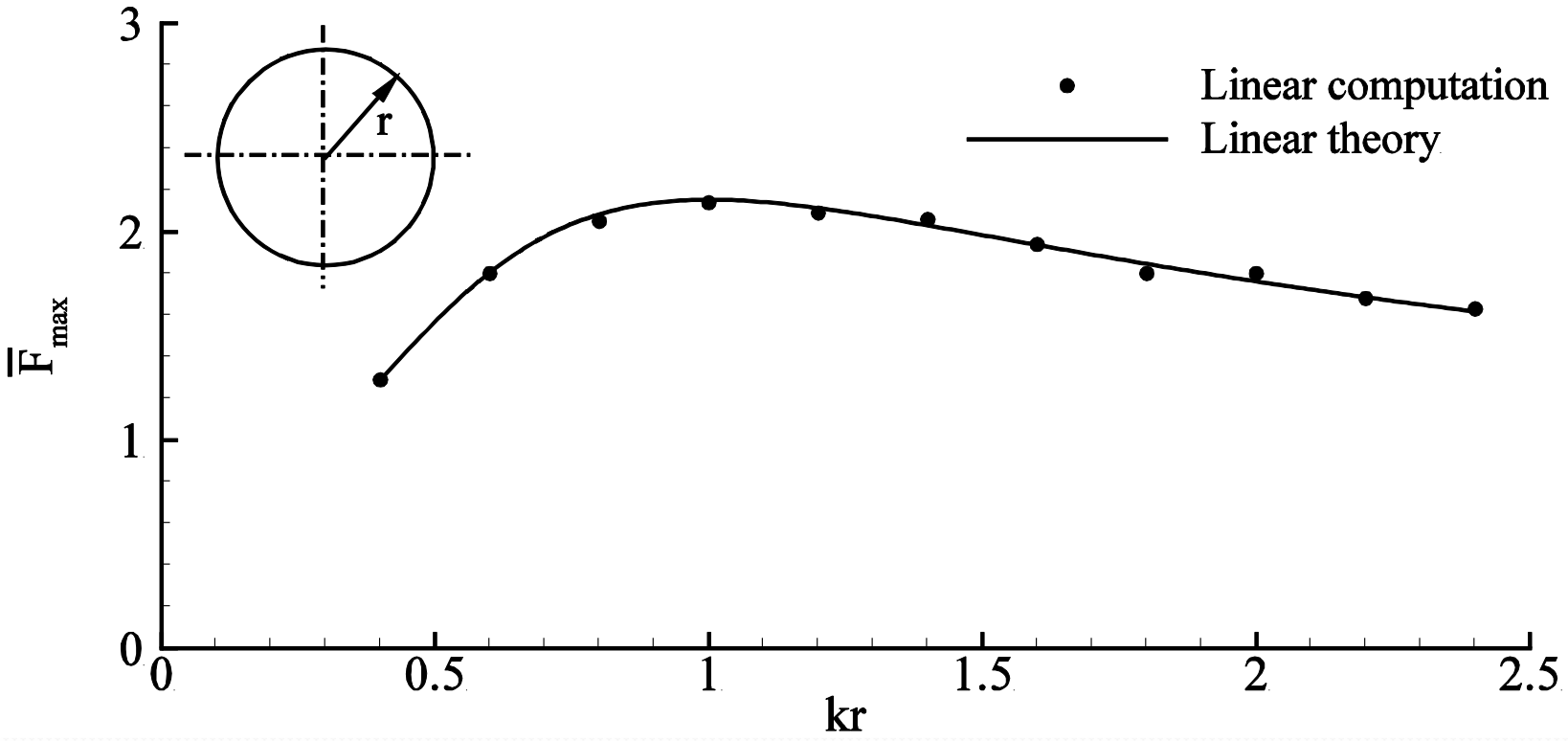
Hydrodynamics: Wave forces acting on bottom-mounted surface-piercing piles

Perspective view of a circular pile in diffracted waves



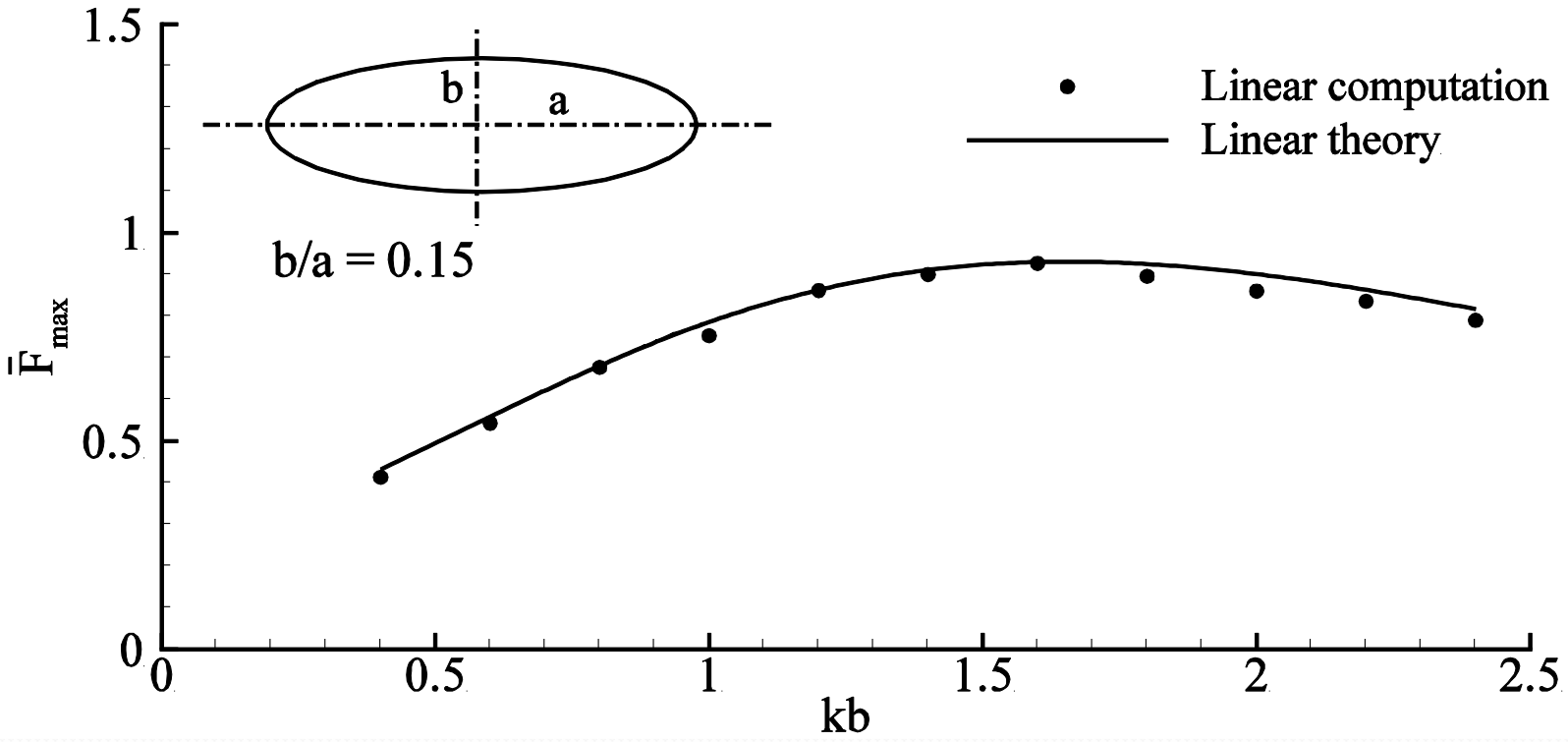
Hydrodynamics: Wave forces acting on bottom-mounted surface-piercing piles

Comparison of the maximum dimensionless wave forces as given by linear theory and time domain simulations for different *kr* values



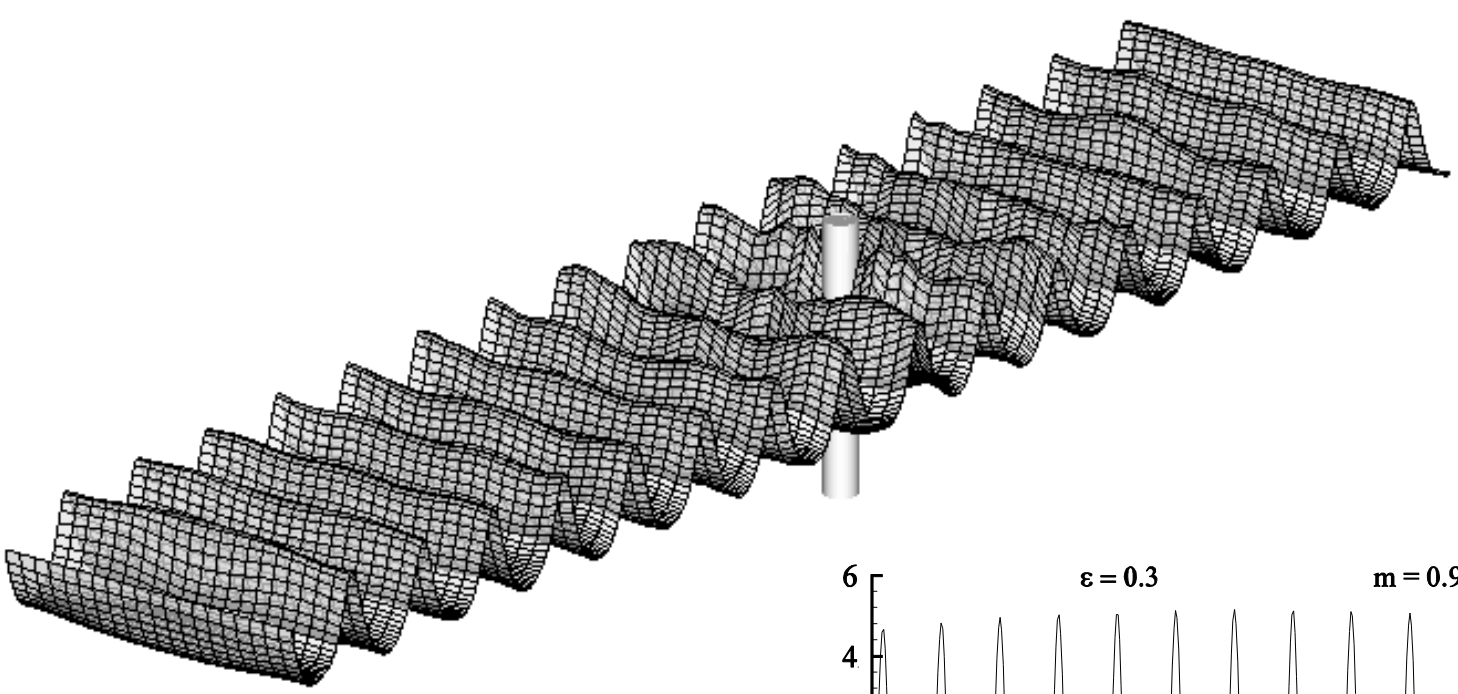
Hydrodynamics: Wave forces acting on bottom-mounted surface-piercing piles

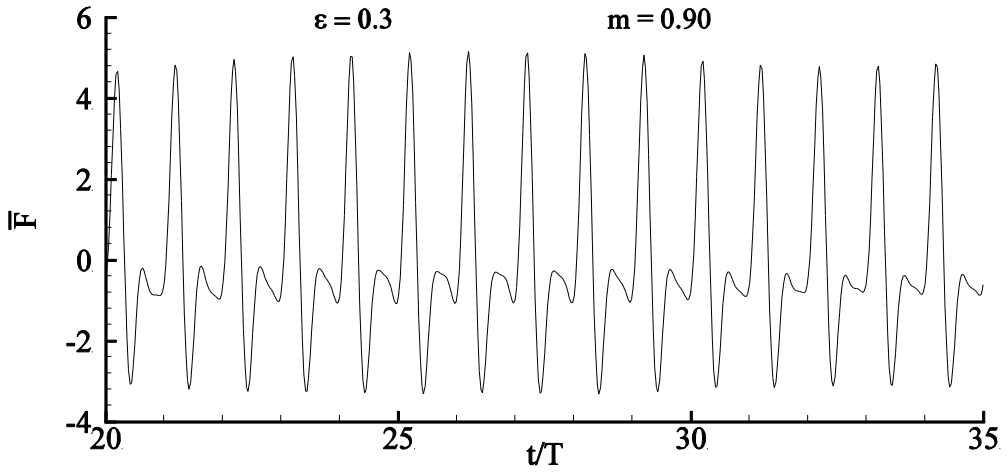
Comparison of the maximum dimensionless wave forces for an elliptic pile *b/a=0.15* as given by linear theory and time domain simulations for different *kb* values



Hydrodynamics: Wave forces acting on bottom-mounted surface-piercing piles

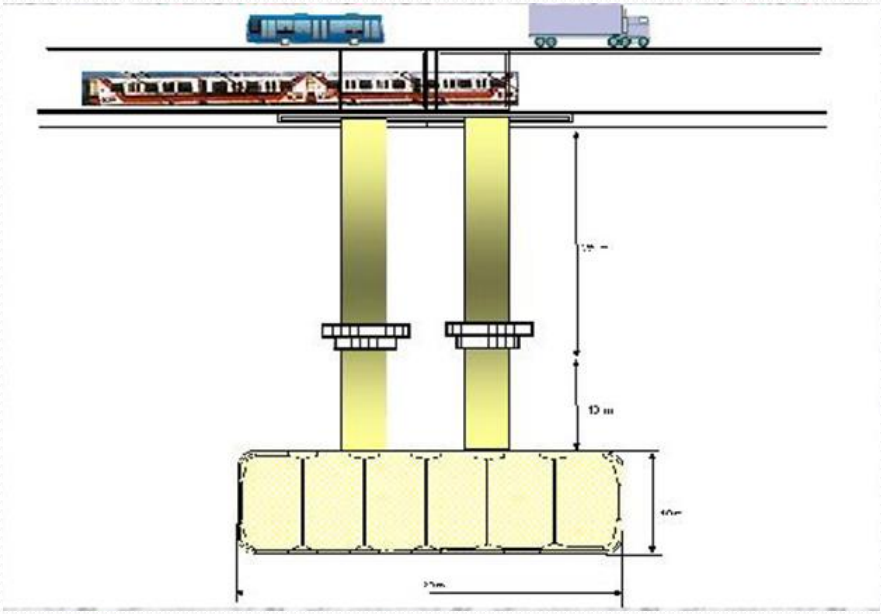
Cnoidal waves incident on a circular pile and normalized wave force

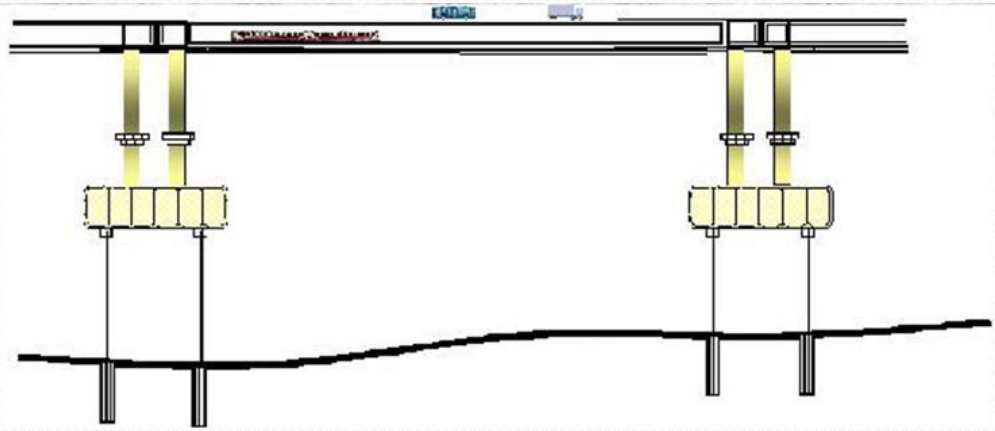




Structural analysis

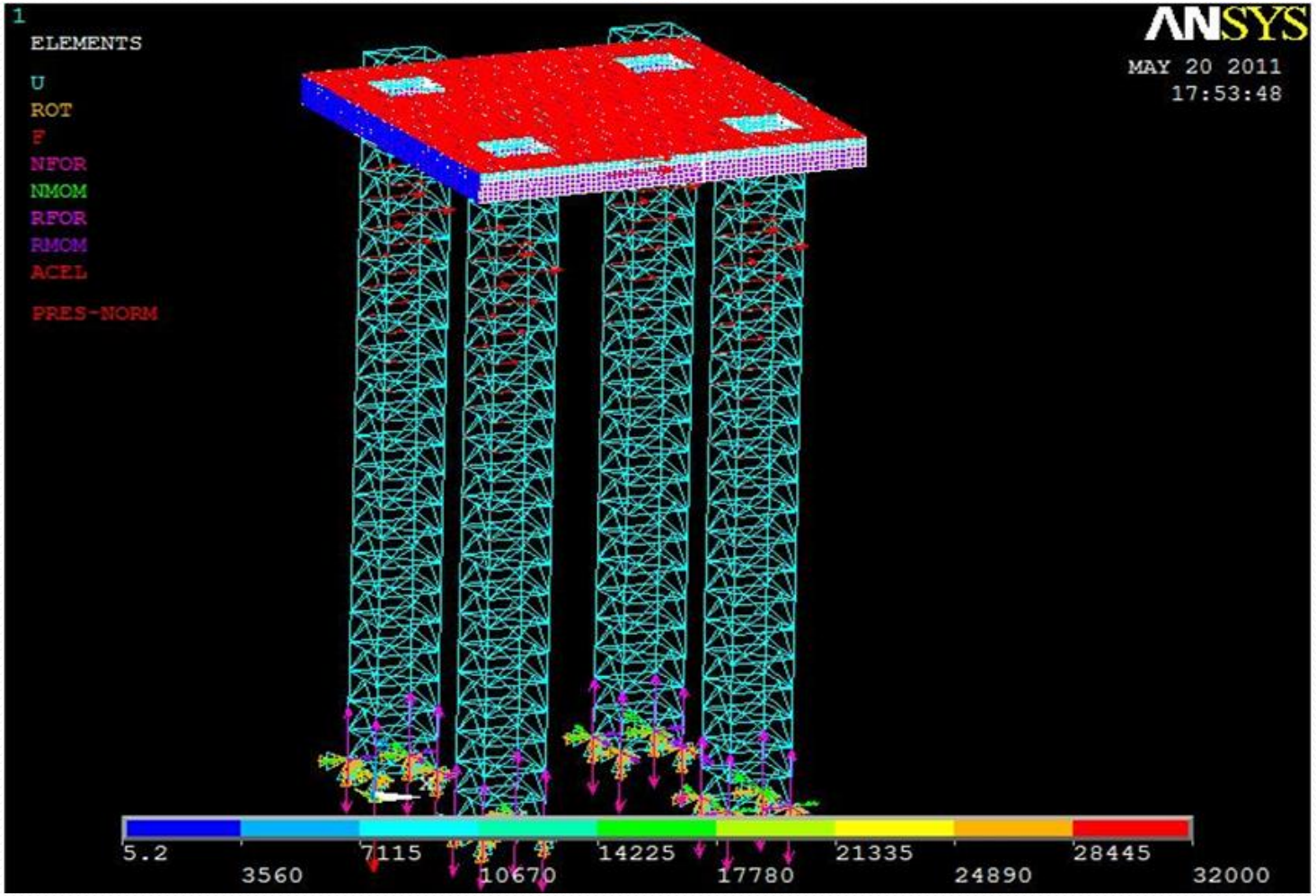
Technical feasibility study of Marmara Sea crossing





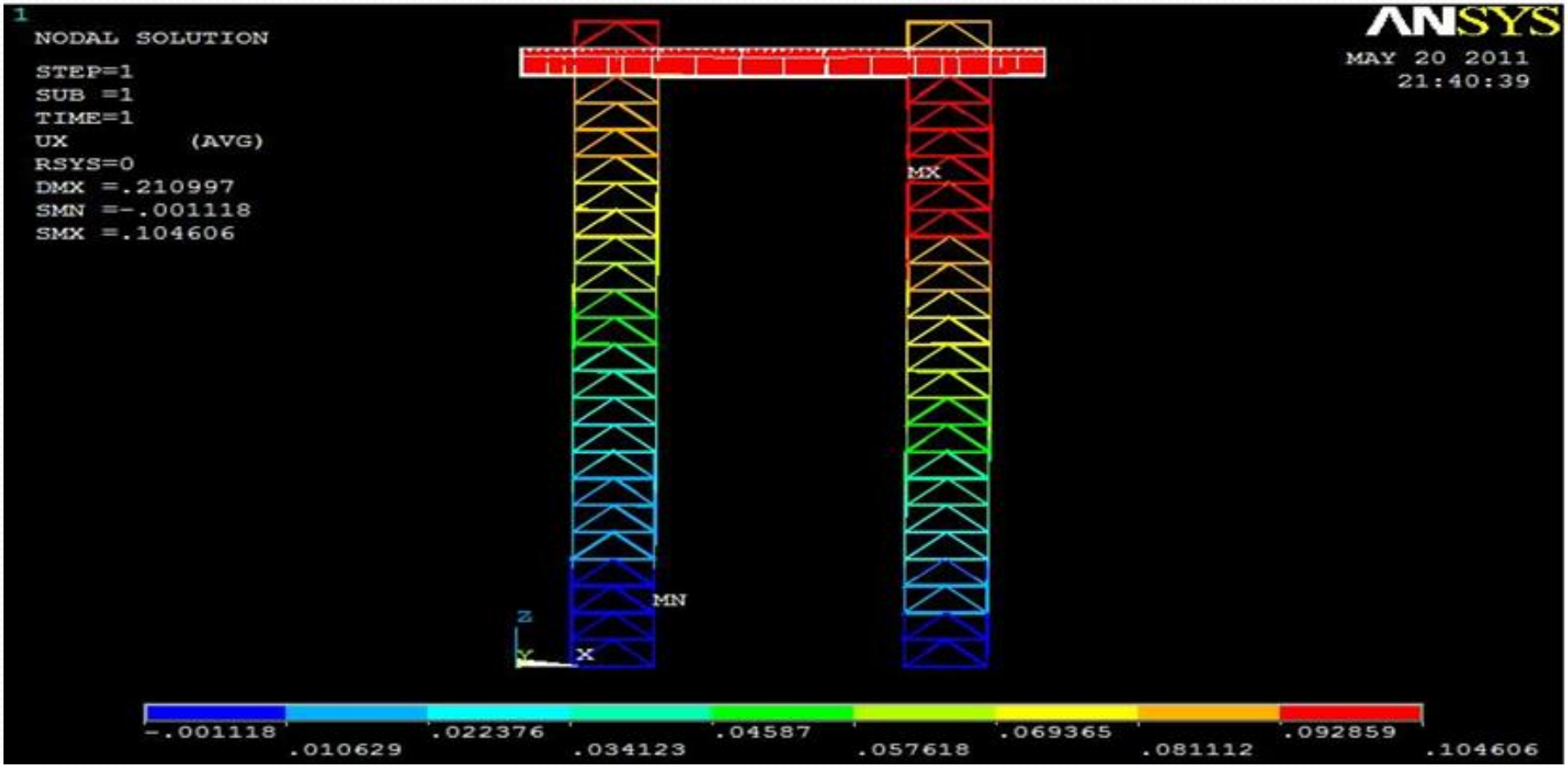
Structural analysis

Stress and displacement analyses of a platform: External loads



Structural analysis

Stress and displacement analyses of a platform: Displacements in the x-direction



Offshore Engineering Graduate Program
Compulsory Courses

Two compulsory courses in mathematics (6 credits):

- Mathematical Methods in Engineering (3)
- Numerical Techniques for Engineering Problems (3)

Two compulsory courses in offshore engineering (6 credits):

- Offshore Hydrodynamics and Water-wave Mechanics (3)
- Dynamics of Marine Structures (3)

Offshore Engineering Graduate Program
Elective Courses

Four elective courses or 12 credits required.
Newly offered elective courses:

- Offshore Moorings (3)
- Offshore Wind Farm Design (3)
- Coastal and Offshore Structures (3)
- Risk Analysis in Marine Technology (3)
- Marine Corrosion and Corrosion Control (3)
- Marine Geo-mechanics (3)

Offshore Engineering Graduate Program
Elective Courses

Four elective courses or 12 credits required.

Existing elective courses:

- Systems Analysis in Offshore Engineering
- Hydrodynamics of Floating Production Systems
- Potential Theory for Offshore Structures
- Boundary Integral Method in Fluid Dynamics

Offshore Engineering Graduate Program
Elective Courses

Four elective courses or 12 credits required.
Existing elective courses:

- Underwater Acoustics
- Marine Pollution and Control
- Finite Element Methods in Fluid Dynamics
- Advanced Computational Methods for Fluid Flow
- Special Problems in Ocean Engineering

Offshore Engineering Graduate Program
Compulsory Requirements

Compulsory to submit a graduation thesis and to attend to non-credit seminars:

- Graduation Thesis
- Seminars

Requirements for a degree in offshore engineering graduate program:

- Two compulsory courses in engineering mathematics (6 credits)
- Two compulsory courses in offshore engineering (6 credits)
- Four elective courses in offshore engineering (12 credits)
- Graduation thesis
- Seminars

Concluding Remarks

- The new program must be in accord with ITU's general framework of graduate programs therefore the existing program is a very good starting point.

- Existing graduate program in Shipbuilding and Ocean Engineering contains the necessary basic compulsory courses.

- The new program introduces a new compulsory course entitled "Offshore Hydrodynamics and Water-wave Mechanics" besides a number of elective courses such as "Offshore Moorings", "Offshore Wind Farm Design", "Coastal and Offshore Structures", "Risk analysis in Marine Technology", "Marine Corrosion and Corrosion Control", "Marine Geomechanics".

- Almost all the faculty staff taking part in the new program obtained his/her doctorate degrees from abroad (mainly U. S. A. or England).