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Geotechnical
Engineering

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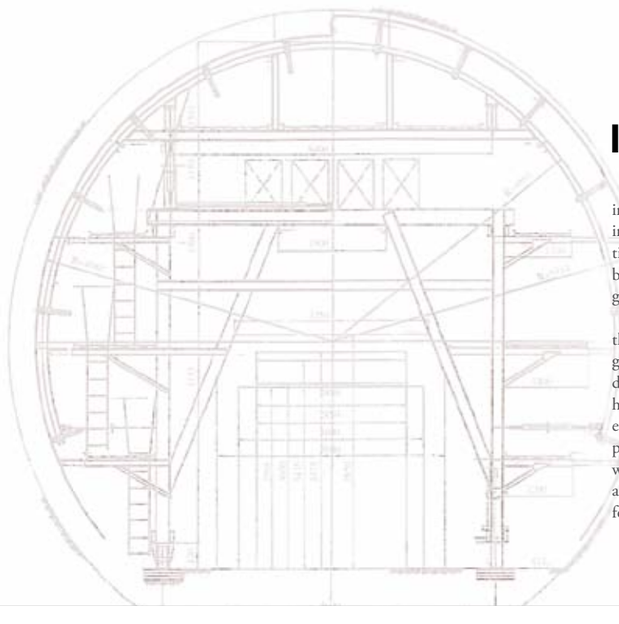

Introduction

Geotechnical engineering is the subdiscipline of civil engineering involving natural materials found close to the ground surface. The subjects include basic material mechanics of the soil and rock, design of foundations, retaining structures and slope, tunneling, and other dynamic behaviors. The research of geotechnical engineering also covers engineering geology, geophysics, hydrology and other related fields.

The geotechnical engineering division of NTU can be traced back to the early stage of CE graduate program established in 1960, with some graduate students conducting their researches in soil engineering. The division was formally established in August 1985. Since then, the discipline has extended to include broader research areas such as rock mechanics and engineering geology. Faculty members in the division are with post-graduate degrees from renowned Universities, well experienced, and with distinguished researches in related fields. The division also provides abundant facilities such as laboratories for soil mechanics, rock mechanics, foundation engineering, and engineering geology.

Geotechnical Engineering

Visions

Considering the fragile geological conditions, frequent typhoons and earthquakes of the natural environment in Taiwan, the fundamental researches in soil mechanics, foundation engineering, soil dynamics, rock mechanics and engineering geology, will be strengthened. In responding to the topics with local concerns, researches will focus on earthquake engineering, slope stability, environmental geotechnique, foundation engineering, tunnel and underground spaces development and GIS applications, and to move further toward internationally concerned topics.

Research topics will be modified according to short-term and long-term needs. The division is dedicated to motivate itself to become the leader in the following research fields:

(1) Foundations and underground spaces engineering
(2) Environmental geotechnology and sustainable development
(3) Integrated research on geotechnical hazards

The division also provides social services actively to the important issues such as geotechnical hazards mitigation, early warning, and land use planning. Students of the division are encouraged to explore and pursue issues encountered in practice, which helps to build up confidence, and to become leaders in the profession.

Research Fields

A. Foundations and underground spaces:
Soft rock behaviors, coupled thermo-hydraulic behaviors of rock mass, foundation engineering and deep excavations, tunnel engineering, underground lifeline engineering, performance-based design in geotechnical engineering, etc.

B. Environmental geotechnology and sustainable development:
Geo-environmental engineering, ecological engineering, in-situ testing, etc.

C. Integrated researches on geotechnical hazards:
Landslides, debris flow, dynamic soil properties, soil liquefaction, seismic ground response, soil-structure interaction, remote sensing and GIS applications, geological hazards, etc.

D. Integrated inter-discipline researches of civil engineering:

a. Remote sensing and new technology
b. Engineering monitoring, image analysis and visualization, GIS applications
c. Disaster reduction technology
d. Environment sustainable development

Facilities

A. Soil Mechanics Laboratory
- Consolidometer
- Permeability test apparatus
- Triaxial test equipment
- CK cyclic triaxial and resonant-column test apparatus
- Cyclic simple shear test apparatus
- Ring shear test apparatus
- Geosynthetic test equipment
- Dynamic hollow cylinder testing system
- Shaking table for small model lab test

B. Rock Mechanics Laboratory
- 25-100 ton loading frame
- 450 ton stiff loading frame
- 5, 10 ton direct shear apparatus
- Laser profilemeter
- Acoustic emission instrument
- Ultrasonic test apparatus
- High temperature/pressure triaxial cell

C. Engineering Geology Laboratory
- Electronic microscope
- Polarizing microscope and software
- Geodetic and surveying instruments
- GIS
- Large format printers
- Image processing system
- Geological maps
- Rock and mineral specimen
- Sandbox for simulation of geological process

D. Foundation Engineering Laboratory
- 20 ton CPT trailer
- Flat dilatometer
- K_0 earth pressure cell
- Laboratory and field hydraulic fracturing test apparatus
- Field vane shear test apparatus
- Continuous surface wave test apparatus

Faculty

Professor Rong-Her Chen
soil reinforcement, slope stability, environmental geotechnology

Professor Cheng-Hsing Chen
geotechnical earthquake engineering, soil-structure interaction, foundation engineering, micro vibration of ground and fab structures

Professor Tsan-Hwei Huang
rock mechanics and engineering, tunnel engineering, numerical simulation

Professor Meei-Ling Lin
slope stability, debris flow, dynamic soil behavior and properties, ground settlement

Professor Fu-Shu Jeng
rock mechanics, tunnel engineering, geomechanics

Professor Ming-Lang Lin
slope stability, engineering geology, rock mechanics

Associate Professor Tien-Hsiung Tso
in-situ tests , slope stability, numerical analysis

Associate Professor Jianye Ching
geotechnical reliability analysis and reliability-based design, uncertainty analysis in geotechnical engineering

Adjunct Faculty

Professor Ju-Jiang Hung
engineering geology , rock engineering, soil mechanics

Professor Tzou-Shin Ueng
soil mechanics, foundation engineering, rock engineering, soil dynamics, soil liquefaction

Associate Professor Shao-Min Hu
soil behavior of soft ground, construction performance, underground excavation and tunnelling, adjacent construction and building protections, deep foundation, piles and piers, ground treatment of problematic soils

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