Geotechnical Engineering is a branch of Civil Engineering which deals with man made materials (concrete, steel, etc) on top of or as inclusions into soils or rocks which are naturally made. The process of interaction between man made materials and the soils and rocks is through methods of construction which is time consuming. A construction process could take a week to several years, through which the materials could change their properties. Specially soils and rock degrade much quicker due to weathering process, stress release (like in excavations), loading process, or drillings and blasting operations. Another aspect to consider is earthquakes which generate a wave of energy propagating from rock beneath the earth toward ground surface which could result in severe damages to the man made infrastructures. These make modeling and simulation of interaction between those materials a complex process.

The modeling and simulation of these phenomena is a difficult task. First, the properties of the materials need to be defined properly. Man made materials are easier to model, however soils and rocks are uncertain, since the strata might change drastically in a few meters distance and the process of formation by nature could take thousands or millions of years.

This paper illustrates the author experience in modeling and simulating the process of construction through various projects in Indonesia and overseas. The predictions include the stresses (normal stress, shear stress, bending force) induced by the interactions of those materials in construction process, displacements as a result of gravity force or construction loads, development of pore water pressures in the soil pores and their effects on the stability. Landslide occurrences and seismic wave propagations can also be modelled. Overall the paper point out the importance of modeling and simulation as interactive analysis and design process.

Biography

Prof. Paulus P. Rahardjo, PhD has been Vice President of Academic Affairs at Parahyangan Catholic University, Bandung, Indonesia since 2006. He has been with the university since 1976 when he started as a teaching assistant and became full professor in 2000. In administrative university employment, he was vice dean in the faculty of engineering (1990-1995), head of graduate program in civil engineering (1995-1998) and deputy director of graduate program (1998-2001) before being appointed director of graduate programs in the university (2001-2005). He has been actively engaged in lecturing, research and professional works. The research work has resulted in more than 150 professional papers published in conference and journals. Since the start of the PhD program at the university in 2000, he has supervised 10 PhD dissertations (8 PhD dissertations are still active), nearly 50 Masters theses and more than 300 undergraduate thesis. Hundreds of projects have been successfully completed in consultancy including foundations of high rise buildings, tanks and towers, foundation of long span bridges, retaining structures, reclamations works, foundation of offshore and near-shore structures, tunnels, landslide analysis and slope protection design, etc. He has also initiated and carried out several consultancy projects on geotechnical and foundation failures in Indonesia which constitute important lessons for practicing engineers as well as students. Topic of his lectures will cover the experience.