THE OBSERVATION OF ROCK BEHAVIOUR IN UNIAXIAL COMPRESSION TEST (STRESS-STRAIN CURVE) ON LIMESTONE

By

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ABSTRACT

This study presents the results of laboratory testing of sedimentary rocks under uniaxial loading as well as in uniaxial compression test. The uniaxial compressive strength of a rock is one of the simplest measures of strength to obtain. It may be regarded as the highest stress that a rock specimen can carry when a unidirectional stress is applied, normally in an axial direction, to the ends of a cylindrical specimen. In other words the uniaxial compressive strength represents the maximum load supported by the specimen during the test divided by the cross-sectional area of the specimen.

Laboratory rock testing is performed to determine the strength, engineering properties and the behaviour of fresh limestone. Fresh limestone was collected from Minerals and Geo-science Department Malaysia. Twenty samples have been prepared for the Uniaxial Compression Test on the fresh limestone. The laboratory performed of physical properties covered density, moisture content, Specific Gravity and porosity. It is also performed of dynamic properties covered Young's Modulus and Poisson's Ratio.

From laboratory performance the Uniaxial Compressive Strength for limestone is between 44.03 MPa to 176.10 MPa respectively. For the engineering properties, it found that the mean of Young's Modulus and Poisson's Ratio are 63.66 GPa and 0.26 respectively. The behaviour of rock in uniaxial compression is influenced to some extent by the test conditions. From the deformation characteristics of limestone in Uniaxial Compression test, it was found that most of the deformation characteristic is in elastic deformation.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Rock differs from most other engineering materials in that it contains fractures of one type or another which render its structure discontinuous. Thus a clear distinction must be made between the rock element or rock material on the one hand and the rock mass on the other rock material.

The nature and distribution of structural features within the rock mass is known as the rock structure. Rock mechanic was defined by the committee on Rock Mechanics of the Geological Society of America in the following terms: 'Rock Mechanics is the theoretical and applied science of the mechanical behavior of rock; it is that branch of mechanics concerned with the response of rock to the force fields of its physical environment' (Judd, 1964). For practical purposes it is mostly concerned with rock masses on the scale which appears in engineering and mining work and so might be regarded as the study of the behavior and properties of accessible rock masses under stress or change of conditions (J. C. Jaeger & N. G. W. Cook, 1979).

In order to predict how rock will behave as an engineering material, certain sets of properties have to be determined, e.g. those of:

- the intact rock
- the fractures
- the whole rock mass.