

UNI-COMPRESSIVE STRAIN MEASUREMENT OF ROCK SAMPLES USING PIC MICROCONTROLLER

The uniaxial compressive strength (UCS) is the maximum axial compressive stress that a right-cylindrical sample of material can withstand before failing. It is also known as the unconfined compressive strength of a material because confining stress is set to zero. It is used to measure the strength of rock or soil sample when crushed in one direction without lateral restraint between the two plate which are moving towards each other gradually. Uniaxial compressive strength is one of the most important mechanical properties of rocks which is mainly used for the design of structures and characterization of intact rock materials. It is mainly used to determine the failure strength of an intact rock specimen.

In National Geophysical Research Institute, to determine the UCS the rock mechanics department make use of Universal Testing Machine (UTM) for applying huge amount of pressure. Currently, they are able to measure only the breaking point of the rock samples.

We are trying to make a prototype system for the measurement of the tensile and compressive strength of rock samples by providing an interface between the load cell and PIC microcontroller. We will also be using the temperature and humidity sensor (HDC1080) for monitoring surrounding humidity and temperature around the sample. The data generated by the load cell and the various sensors will be send to the PIC microcontroller through ADC which will then be displayed in LCD, subsequently the data would be transferred to computer through serial communication for storage and further can be used for real-time processing and data analysis.

We have experimented with three rock samples which are basalt rock, coarse granite rock and granite rock with the successful data collection to the computer. Now, we are using the data for the further processing in order to obtain the values of different parameters of rock samples. Hence, the performance of the different parameters will be shown through graphical representation after the successful analysis of the data.

Keyword- universal testing machine (UTM), uniaxial compressive strength (UCS), PIC microcontroller (18F452), temperature and humidity sensor (HDC1080), analog to digital convertor (ADC- HX711), Serial communication (RS232), load cell and LCD.

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