**Determination of relationship between Uniaxial Compressive Strength (UCS) and rock densities using fractal modelling in Karoun-4 Dam, SW Iran**

**Mahdi Mahdizadeh1, Kaveh Ahangari1, Akbar Javadi2, Peyman Afzal3, 4\*, Amir Bijan Yasrebi2, 4**

1 Department of Mining Engineering, Science and Research Branch, Islamic Azad University, Tehran, Iran

2 College of Engineering, Mathematics and Physical Sciences, University of Exeter, Exeter, UK

3 Department of Mining Engineering, South Tehran Branch, Islamic Azad University, Tehran, Iran

4 Camborne School of Mines, University of Exeter, Penryn, UK

\*peymanafzal@yahoo.com

ABSTRACT

The aim of this study is to identify different populations for rock characterisation based on uniaxial compressive strength (UCS) and density within limestones of Karoun-4 Dam, SW Iran. The results from a Number-Size (N-S) fractal model log-log plots for UCS and density for the rocks reveal that there are four populations for the studied variables. The last populations for UCS and density commence from 87 MPa and 2.65 t/m3, respectively. Finally, a log-ratio matrix is introduced to validate and determine the overlaps between the N-S fractal model for UCS and density values within the main rock type. The overall accuracy (OA) is 85% which shows that there are positive correlations between UCS and rock density in the Karoun-4 Dam.

***Keywords:*** *Number Size Fractal Modelling; Uniaxial Compressive Strength; Logratio Matrix (UCS); Karoun-4*