



XIAMEN UNIVERSITY MALAYSIA

廈門大學 馬來西亞分校

## Research Talk

### MATRICES AND DISTANCES IN GRAPHS

April 28, 2023 (Friday), 3:30–4:30 pm Room A4#G04



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Research interests: Algebraic graph theory with its connection to finite group theory, commutative algebra, and linear algebra.

### SPEAKER INTRODUCTION

Dr. Ali Azimi is an assistant professor at Xiamen University Malaysia. Dr. Ali Azimi was graduated in 2014 at Ferdowsi University of Mashhad, Iran. Prior to that he got his MSc at the same university Ferdowsi University of Mashhad. Also, Dr. Ali Azimi was a Lecturer and an assistant professor at Neyshabur University, and Ferdowsi University of Mashhad, Iran.

### ABSTRACT

We will talk about various distances that naturally exist among vertices of a graph. First, we introduce basic concepts in graphs and different types of distances that can be defined between vertices of the graph. Next, we focus on distance matrices of graphs as matrices illustrating (ordinary) distances between pairs of vertices of the graph. We will also discuss the Steiner distance in graphs as a generalization of the ordinary distance that takes into account the presence of Steiner points.

In the second part, we shift our focus to resistance distances in graphs, as a measure for effective electrical resistance between two vertices of the graph, and present some properties of resistance distances. Finally, we discuss the Moore-Penrose inverse of a matrix, a generalization of the matrix inverse that can be applied to non-invertible matrices, and explain how the Moore-Penrose inverse is related to resistance distances in a graph.