

Preface

Special issue dedicated to Professor Roger Penrose's 90th Birthday

Born on 8 August 1931, Sir Roger Penrose is a British mathematician, mathematical physicist, philosopher of science and Nobel Laureate in Physics. He is an Emeritus Rouse Ball Professor of Mathematics at the University of Oxford.

Penrose has made contributions to the mathematical physics of general relativity and cosmology. He has received several prizes and awards, including the 1988 Wolf Prize in Physics, which he shared with Stephen Hawking for the Penrose-Hawking singularity theorems, and the 2020 Nobel Prize in Physics "for the discovery that black hole formation is a robust prediction of the general theory of relativity".

In 1955, while still a student, Penrose introduced the E.H. Moore generalized matrix inverse, also known as the Moore-Penrose inverse, after it had been reinvented by Arne Bjerhammar in 1951.

The *Moore-Penrose inverse* is the matrix $A^\dagger \in \mathbb{C}^{n \times m}$ that satisfies the following four equations:

$$AA^\dagger A = A, \quad A^\dagger AA^\dagger = A^\dagger, \quad (AA^\dagger)^* = AA^\dagger, \quad (A^\dagger A)^* = A^\dagger A.$$

Penrose also introduced the *best approximation solutions* of linear matrix equations, which means that

$$\|Ax - b\|_2 \geq \|AA^\dagger b - b\|_2$$

for any $A \in \mathbb{C}^{m \times n}$ and $b \in \mathbb{C}^m$. It is a well known result which exploits the generalized inverse of a matrix to find the best approximate solution x to the matrix equation $Ax = b$, where A is rectangular or square and singular.

Thousands of papers on various theoretical and computational aspects of generalized inverses and their applications have appeared since Penrose's work in 1955.

This Special Issue, dedicated to Professor Roger Penrose on the occasion of his 90th birthday, includes the following six papers:

- Least Squares Properties of Generalized Inverses
Predrag S. Stanimirović, Dijana Mosić and Yimin Wei

- A Finite Method for Computing the Drazin and Core-EP Inverses of Matrices Based on Partial Full-Rank Factorization
Xuzhou Chen and Jun Ji
- The L^* Partial Order on the Set of Group Matrices
Xiaoji Liu, Fang Gui and Hongxing Wang
- The Pseudo Drazin Inverses in Banach Algebras
Jianlong Chen, Zhengqian Zhu and Guiqi Shi
- Perturbation of the Weighted T-Core-EP Inverse of Tensors Based on the T-Product
Yuhang Liu and Haifeng Ma
- Further Results on the Drazin Inverse of Tensors via Einstein Product
Chunmeng Liu, Lizhu Sun and Changjiang Bu

The topics of this special issue lie in the broad area of generalized inverses and computational methods. All the papers in this issue have been peer reviewed to meet the high standards of this journal. We express our sincere gratitude to all the authors for their wonderful research. We appreciate the encouragement of Editor-in-Chief Tao Tang and the professional reviews by the anonymous referees.

Special Issue Editor:

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