A gaze at recent applications and characterizations of the Moore–Penrose inverse

Oskar Maria Baksalary[1] **and Götz Trenkler**[2]

[1] *Adam Mickiewicz University in Poznań, Poland*
[2] *Dortmund University of Technology, Germany*

Abstract

The Moore–Penrose inverse is to celebrate its 100th birthday in 2020, as the notion standing behind the term was first defined by Moore in 1920 [1]. Its rediscovery by Penrose in 1955 [2] can be considered as a caesura after which the inverse attracted the attention it deserves and has henceforth been exploited in various research areas of applied origin. During the talk we will discuss several examples of recent applications of the Moore–Penrose inverse demonstrating that the notion continues to play a role of a valuable tool to cope with the current research problems.

A part of the talk will be devoted to the results concerned with the representations of the Moore–Penrose inverse of matrices. The topic has attracted a considerable attention over the years and several different approaches were exploited so far. In the talk we will recall some of the available results (concerned e.g., with matrices modified by matrices of rank-one, partitioned matrices, functions of other generalized inverses, or functions of a square matrix represented by the Hartwig–Spindelböck decomposition) and shed light on selected problems considered by the authors.

Keywords

Generalized inverses of matrices, Partitioned matrices.

References

[1] Moore, E.H. (1920). On the reciprocal of the general algebraic matrix. *Bull. Amer. Math. Soc. 26*, 394-395.

[2] Penrose, R. (1955). A generalized inverse for matrices. *Math. Proc. Cambridge Philos. Soc. 51*, 406-413.