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*A New Class of Matrix Support Functionals with Applications*

A new class of matrix support functionals is presented which establish a connection between optimal value functions for quadratic optimization problems, the matrix-fractional function, the pseudo matrix-fractional function, and the nuclear norm. It is therefore significant for different areas such as machine and statistical learning or inverse problems. The support function is based on the graph of the product of a matrix with its transpose. Closed form expressions for the support functional and its subdifferential are derived. In particular, the support functional is shown to be continuously differentiable on the interior of its domain, and a formula for the derivative is given when it exists.