Hardy type inequalities on the cone of monotone sequences

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Abstract: Weighted Hardy type inequalities restricted to the cones of monotone functions and sequences, as well as their applications in the estimation of maximal functions, in the theory of interpolation of operators, in the embedding theory and their relations with the stochastic inequalities have been extensively studied within the last two decades. We study Hardy type inequality on the cone of non-negative and non-increasing sequences under weaker conditions than those studied before in the literature. We introduce a general class of matrices, which includes well-known classical operators such as the operator of multiple summation, Holder's operator, Cesaro's operator and others. Such classes of matrices are wider than those previously studied in the theory of discrete Hardy type inequalities. We investigate two-sided estimates for matrix operators on the cone of non-negative and non-increasing sequences, when the corresponding matrices belong to such classes. We obtain new results, which generalize the known results of this subject.

Keywords: inequalities, weighted matrix inequalities, weights, matrix operators, summable matrix, summation methods.