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Summary: In the paper, two kinds of inverse problems for generalized arrow matrix $A$ are discussed. One is to construct $A$ from the minimum and maximum eigenvalues of its rear leading principal sub matrices $A_{j,n}$, that is the inverse eigenvalue problem of matrix. The other one is to find generalized arrow matrix $A$ with the given real vector pairs $(x_u, u_u)(x_d, u_d)(z, w)$ in dimensions of $s, n - s + 1$ and $n$, such that $A_{1,s}x_u = u_u, A_{s,n}x_d = u_d, Az = w$. This kind of problem is called vector pair inverse problem. The necessary and sufficient conditions for these two kinds of problems to have unique solutions are given, and the correctness and feasibility of the theorems are verified by numerical examples.

MSC:
15A18 Eigenvalues, singular values, and eigenvectors
15A29 Inverse problems in linear algebra

Keywords:
inverse problem; generalized arrow matrix; eigenvalue; rear leading principal sub matrix; vector pair