The generalized orthogonal flows

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Abstract

In the field of scientific computation, the orthogonal iteration plays an important role in computing the invariant subspace corresponding to the largest k eigenvalues. In this paper, we construct a flow that connects the sequence of matrices generated by the orthogonal iteration. Such a flow is called an orthogonal flow. In addition, we also show that the orthogonal iteration forms a time-one mapping of the orthogonal flow. By using a suitable change of variables, the orthogonal flow can be transformed into a Riccati differential equation (RDE). Conversely, a RDE also can be transformed to a flow which can be represented by the orthogonal flow multiplied by an orthogonal matrix.