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Circular Hessenberg pairs and the tridiagonal relations

A square matrix is said to be Hessenberg whenever each entry below the subdiagonal is zero, and each entry on the subdiagonal is nonzero. A Hessenberg matrix is called circular whenever the top-right corner entry is nonzero, and every other entry above the superdiagonal is zero. A circular Hessenberg pair consists of two diagonalizable linear maps on a nonzero, finite-dimensional vector space, that each act on an eigenbasis of the other one in a circular Hessenberg fashion. In 2022, Jae-ho Lee conjectured that a circular Hessenberg pair satisfies two relations called the tridiagonal relations. In this talk, we prove Lee's conjecture. Our proof is not elementary. This is joint work with Kazumasa Nomura.