1145-VQ-629 **Mehmet Gumus*** (mzg0083@auburn.edu), 221 Parker Hall, Auburn, AL 36849. *Positive Diagonal Solutions to the Lyapunov Matrix Inequalities.*

A square real matrix A is said to be Lyapunov diagonally stable if there exists a positive diagonal matrix D such that $AD + DA^T$ is positive definite. This type of matrix stability plays an important role in various applied areas such as population dynamics, systems theory, complex networks, and mathematical economics. In this talk, we examine a result of Redheffer that reduces Lyapunov diagonal stability of a matrix to common diagonal Lyapunov solutions on two matrices of order one less. An enhanced statement of this result based on the Schur complement formulation is presented here along with a shorter and purely matrix-theoretic proof. We develop a number of extensions to this result, and formulate the range of feasible common diagonal Lyapunov solutions. In particular, we derive explicit algebraic conditions for a set of 2×2 matrices to share a common diagonal Lyapunov solution. (Received September 11, 2018)