1057-65-252   **Jungong Xue*** (`xuej@fudan.edu.cn`), School of Mathematical Science, Fudan University, Shanghai, 200433, Peoples Rep of China, and **Qiang Ye**. *Computing Exponentials of Essentially Non-negative Matrices Entrywise to High Relative Accuracy.* Preliminary report.

A real square matrix is said to be essentially non-negative if all of its off-diagonal entries are non-negative. The exponential of an essentially non-negative matrix is determined entrywise to high relative accuracy by its entries. For general essentially nonnegative matrices, a stable method based on Taylor series is presented to compute their exponentials with high entrywise relative accuracy. For symmetric matrices, upper triangular matrices and tridiagonal matrices that are essentially non-negative, it is shown that the polynomial method for exponentials can be implemented to achieve high entrywise relative accuracy. (Received January 24, 2010)