Efficient Generation and Use of Power Series for Broad Application. JOSEPH RUDMIN, JAMES SOCHACKI, James Madison University — A brief history and overview of the Parker-Sockacki Method of Power Series generation is presented. This method generates power series to order n in time n^2 for any system of differential equations that has a power series solution. The method is simple enough that novices to differential equations can easily learn it and immediately apply it. Maximal absolute error estimates allow one to determine the number of terms needed to reach desired accuracy. Ratios of coefficients in a solution with global convergence differ signficantly from that for a solution with only local convergence. Divergence of the series prevents one from overlooking poles. The method can always be cast in polynomial form, which allows separation of variables in almost all physical systems, facilitating exploration of hidden symmetries, and is implicitly symplectic.

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