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**Harry Gingold** ([gingold@math.wvu.edu](mailto:gingold@math.wvu.edu)), Department of Mathematics, West Virginia University, Morgantown, WV 26506, and **Fei Xue\*** ([fxue@math.wvu.edu](mailto:fxue@math.wvu.edu)), Department of Mathematics, West Virginia University, Morgantown, WV 26506. *A New Technique for Asymptotic Summation of Potentially Oscillatory Difference Systems.*

A new technique for the asymptotic summation of linear systems of difference equations  $Y(t+1) = (D(t) + R(t))Y(t)$  is derived. A fundamental solution  $Y(t) = \Phi(t)(I + P(t))$  is constructed in terms of a product of two matrix functions. The first function  $\Phi(t)$  is a product of the diagonal part  $D(t)$ . The second matrix  $I + P(t)$ , is a perturbation of the identity matrix  $I$ . Conditions are given on the matrix  $D(t) + R(t)$  that allow us to represent  $I + P(t)$  as an absolutely convergent resolvent series without imposing stringent conditions on  $R(t)$ . Our method could be applied to discretized version of singularly perturbed differential equations  $Y'(t) = A(t)Y(t)$  that fit the setting of quantum mechanics. (Received September 20, 2005)