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)