SANGYOUB LEE, Seoul National University

A New Method of Solution for the Fredholm Integral Equation of the Second Kind

When no useful solution is available for a Fredholm integral equation of the second kind, one is apt to resort to a power series solution that can be generated by the method of successive approximations. If the kernel function contained a smallness parameter, this might give a numerically good result. Otherwise, the series can converge very slowly or may even diverge. In such cases, one usually employ the Padé approximant to the series. Usually, this provides a numerically easier procedure than dealing with the resolvent function expressed in terms of Fredholm determinants. Recently, we have proposed a new approximate solution method for the Fredholm integral equation of the second kind with nonzero kernel function. Except that the kernel function must not be zero, the method is general and provides an approximate analytic solution to the problem. Moreover, it gives numerically more accurate results than the Padé approximation method for the same computational cost. Our new solution method has been found to be very useful in the problems of diffusion-influenced chemical kinetics. More recently, we have also found that a similar strategy can be employed to resum the Brillouin-Wigner perturbation series in quantum mechanics.