

ON SOLVING SOME CAUCHY SINGULAR INTEGRAL EQUATIONS BY DE LA VALLÉE POUSSIN FILTERED APPROXIMATION

D. Occorsio, **M. G. Russo**, and W. Themistoclakis
Department of Mathematics, Computer Science and Economics
University of Basilicata, Italy
mariagrazia.russo@unibas.it

A numerical solution of Cauchy Singular Integral Equations with constant coefficients based on some non standard polynomial quasi-projection of de la Vallée Poussin type is proposed.

Such kind of approximation presents several advantages over classical Lagrange interpolation such as the uniform boundedness of the Lebesgue constants, the near best order of uniform convergence to any continuous function, and a strong reduction of Gibbs phenomenon [1].

These features are inherited by the proposed numerical method which is stable and convergent, and provides a near best polynomial approximation of the sought solution by solving a well conditioned linear system. The numerical tests confirm the theoretical error estimates and, in case of functions subject to Gibbs phenomenon, they show a better local approximation compared with analogous Lagrange projection methods [2].

References

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- [2] M. C. De Bonis and G. Mastroianni., *Direct methods for CSIE in weighted Zygmund spaces with uniform norm*, Riv. Mat. Univ. Parma, 2 (2011), pp. 29–55.