APPROXIMATE SOLUTIONS OF CERTAIN GENERAL TYPES OF BOUNDARY PROBLEMS FROM THE STANDPOINT OF INTEGRAL EQUATIONS*

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1. *Introduction.* The principle of Rayleigh†, which is used by physicists to obtain practical solutions of certain boundary problems, assumes that the system under consideration may be replaced by an approximating algebraic system so chosen that the difference between the solutions of the two systems is negligible. It is evident that the practical value of this principle depends not only on the possibility of choosing an approximating system which can be easily solved, but also on the possibility of estimating the order of difference between the solutions.

In a paper published in 1923, M. Plancherel‡ presented a justification of the use of the difference system as an approximating system for a second order self adjoint linear differential equation with simple boundary conditions. He does not discuss the order of approximation of solutions. Such a discussion has been given by N. Bogoliouboff and N. Kryloff.§ R. Courant,‖ in a paper which appeared in 1926, showed that certain integro-differential boundary problems could also be approximated by the method of

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† Lord Rayleigh, *Theory of Sound*, vol. 1, pp. 89–96.

‡ M. Plancherel, Bulletin des Sciences Mathématiques, (2), vol. 47 (1923), pp. 153-160, 170–177.

§ N. Bogoliouboff and N. Kryloff, Annals of Mathematics, (2), vol. 29 (1928), pp. 255–275.

‖ R. Courant, Acta Mathematica, vol. 49 (1926), pp. 1-67.