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CORNELL UNIVERSITY

THE SOLUTION BY ITERATION OF LINEAR FUNCTIONAL EQUATIONS IN BANACH SPACES[1]

BY F. E. BROWDER AND W. V. PETRYSHYN

Communicated December 20, 1965

Let X be a Banach space (real or complex), T a bounded linear operator from X to X. We are concerned with the solution of the equation

$$u - Tu = f, \tag{1}$$

by the iteration process of Picard-Poincaré-Neumann,

$$x_{n+1} = Tx_n + f \quad (x_0 \text{ given}), \tag{2}$$

i.e. with the convergence of the sequence

$$x_n = T^n x_0 + (f + Tf + \cdots + T^{n-1}f).$$

By an earlier result of the first-named author (Browder [2]), if X is reflexive, a solution u for the equation (1) will exist for a given element f of X and an operator T which is *asymptotically bounded* (i.e. $\|T^k\| \leqq M$ for some $M > 0$ and all $k \geqq 1$) if and only if the sequence $\{x_n\}$ is bounded for any fixed x_0. Our object in the present paper is to

[1] The preparation of this paper was partially supported by NSF Grant GP-3552.