

If F is called regular if a normal regular matrix exists with field F , a regular field is co-regular; F is regular if and only if $f(x) = \lim x_n$ is continuous on (c) using the "Mazur norm" $\|x\| = \sup \left| \sum_{k=0}^n a_{nk} x_k \right|$. Subfields of regular fields are regular. Other conditions are given. All Mazur metrics for a given field are equivalent and all fields are separable. A field is a non-reflexive Banach space. A normal conservative matrix sums only convergent sequences if and only if $\|A^{-1}\| < \infty$ where $\|A\| = \sup \sum_{k=0}^n |a_{nk}|$. (Received March 20, 1947.)

241. J. E. Wilkins: *Neumann series of Bessel functions.*

Suppose that $|f(t)|$ is integrable over $(0, a)$ and that $t^{-3/2}|f(t)|$ is integrable over (a, ∞) whenever $a > 0$. Let $s = \sum_{n=0}^{\infty} a_{2n+1} J_{2n+1}(x)$, where $a_{2n+1} = \int_0^a t^{-1} f(t) J_{2n+1}(t) dt$, be the Neumann series associated with $f(x)$. It is shown that $s = \{f(x+) + f(x-)\} / 2$ at each positive point x in a neighborhood of which $f(t)$ is of bounded variation if and only if $\int_1^{\infty} r J_0(xr) dr \int_a^N f(t) J_0(tr) dt$ converges to zero as a approaches zero and N approaches ∞ . (Received March 21, 1947.)

APPLIED MATHEMATICS

242. J. W. Calkin: *Incipient shock waves in one dimension.*

The author considers the following one-dimensional model: a rectilinear cylinder, closed at one end by a piston, and containing a perfect gas. As is in effect known, while a discontinuous increase in piston velocity produces an immediate shock wave, starting at the piston face, a continuous acceleration results in a delayed shock which starts at a positive distance from the piston face, with initial velocity that of sound. The present paper is concerned with the boundary value problem to which the study of the subsequent motion leads, and provides procedures for approximating to the solution. A variant of the hypothesis of a perfect gas is also considered. (Received March 21, 1947.)

243. J. B. Díaz and H. J. Greenberg: *The determination of upper and lower bounds for the deflection of a clamped plate.*

A method is given for the determination of upper and lower bounds for the deflection w at any point of a thin elastic plate of arbitrary shape clamped along its edges and subjected to a distributed load. The method is based on the application of two variational principles: the first is that of minimum potential energy, the second is closely related to Castigliano's principle of minimum complementary energy but does not seem to have been used before in the present form. These principles yield inequalities for an integral of w . By considering two auxiliary loadings of the plate, in addition to the given loading, inequalities are obtained directly for w at any specified point. The bounds are obtained in terms of integrals of certain admissible functions. Explicit iterative formulas are given by means of which sequences of admissible functions can be utilized to successively improve the bounds. (Received March 21, 1947.)

244. J. B. Díaz and Alexander Weinstein: *Schwarz' inequality and the methods of Rayleigh-Ritz and Trefftz.*

It is shown that lower and upper bounds of a quadratic functional can be obtained by a simple and direct application of Schwarz' inequality and Green's formula, the results being equivalent to the application of the methods of Trefftz and Rayleigh-