$p=1, 2, 3, \cdots$, and put $G_p=|g_p|^2/R(g_p)$, $\tau_p=I(g_p)/R(g_p)$. Let W denote the open region exterior to the cut along the real axis from -1 to $-\infty$, and let $(1+z)^{1/2}$ be the branch of the square root which is 1 for $z=0$. The continued fraction $1/1+G_1z/(1-i\tau_1(1+z)^{1/2})+(1-G_1)G_2z/(1-i\tau_2(1+z)^{1/2})+(1-G_2)G_3z/(1-i\tau_3(1+z)^{1/2})$ $+\cdots$ converges uniformly over every bounded closed region in W. The class of functions $F(z)$ which are analytic and have positive real parts in W, and equal 1 for $z=0$, is coextensive with the class of functions $(1+z)^{1/2}f(z)$, where $f(z)$ is the value of a continued fraction of the above form, or of a terminating continued fraction of that form in which the last G_p may equal 1. (Received July 12, 1945.)

168. H. S. Wall: *Theorems on arbitrary J-fractions.*

Let $1/(b_1+z)-a_1^2/(b_2+z)-a_2^2/(b_3+z)-\cdots$ $(a_p\neq 0)$ be an arbitrary J-fraction. Let $x_p=X_p(z)$, $x_p=Y_p(z)$ be the solutions of the system $-a_{p-1}x_{p-1}+(b_p+z)x_p-a_px_{p+1}=0$, $p=1, 2, 3, \cdots$ $(a_0=1)$ under the initial conditions $x_0=-1$, $x_1=0$ and $x_0=0$, $x_1=1$, respectively. The *indeterminate case* or the *determinate case* holds according as both the series $\sum|X_p(0)|^2$, $\sum|Y_p(0)|^2$ converge or at least one diverges, respectively. It is shown that in the indeterminate case, if the J-fraction converges for a single value of z, it converges for every value of z to a meromorphic function. If the J-fraction is *positive definite*, the associated J-matrix has one or infinitely many bounded reciprocals for $I(z)>0$ according as the determinate or the indeterminate case holds, respectively. Let $k_1, k_2, k_3, \cdots$ be numbers different from zero such that $\sum|k_{2p+1}|$ and $\sum|k_{2p+1}(k_2+k_4+\cdots+k_{2p})^2|$ converge. If $\lim_{p=\infty}|k_2+k_4+\cdots+k_{2p}|=\infty$, the continued fraction $1/k_1z+1/k_2+1/k_3z+1/k_4+\cdots$ converges for every z to a meromorphic function or else to the constant ∞. If the above limit does not exist, or is finite, then the continued fraction diverges by oscillation for every z. (Received June 8, 1945.)

Applied Mathematics

169. Stefan Bergman: *The integration of equations of fluid dynamics in the three-dimensional case.*

The author describes methods for the determination of potentials of *three-dimensional* flow patterns which are of interest in the theory of turbines. In order to obtain an approximate potential of an axially symmetric flow of a given type defined in the domain D, he determines the complex potential $g(z)$, $z=x+iy$, of a two-dimensional flow in the meridian plane of D, that is, in the region which is the intersection of D with the plane $\phi=$const. (r, θ, ϕ are the polar coordinates). Applying to $g(z)$ the operator introduced in Math. Zeit. vol. 24 (1926) pp. 641–669 he obtains a function which approximates the potential of the desired flow. (See, for example, the above paper, p. 655, where the potential of an axially symmetric flow in a turbine is given.) Using more complicated processes, potentials of general (not necessarily axis symmetric) flows can be obtained. These potential functions are used as first approximations to solutions of nonlinear equations of fluid dynamics. (Received July 30, 1945.)

170. Herbert Jehle: *A new approach to stellar statistics.*

A wave equation of the Schroedinger type, $[(\bar{\sigma}^2/2)\nabla^2+(\bar{\sigma}/i)\partial/\partial t-c^2-U]\cdot\{|\psi|\exp(iS/\bar{\sigma})\}=0$, where $\bar{\sigma}$ is a constant, c the velocity of light and U the potential field, is known to admit a hydrodynamical interpretation: It splits into two real