tive, real-valued, non-negative, finite measure function on E, vanishing only for ϕ, the zero of E. E is given the star-topology of G. Birkhoff, and it is shown that E will have such a measure if and only if it is metrizable in a certain way in this topology. It is next shown that E is a topological space if and only if it satisfies a certain distributive law. A basis for the neighborhoods of ϕ can then be characterized algebraically, making it possible to state simple algebraic equivalents for the various separation axioms. If E satisfies the countable chain condition, T_3 implies metrizability, which gives an outer measure on E. A measure is obtained by means of an additional algebraic requirement. Thus, if E satisfies the distributive law referred to, the countable chain condition, the algebraic equivalent of T_3, and the additional requirement, there exists a measure-function on E. These conditions are easily seen to be necessary. It is not known whether they are independent. (Received October 2, 1943.)

250. R. M. Thrall: *On the decomposition of modular tensors.* II.

Let G be the n-rowed full linear group over a field k of characteristic p. A representation of G is called a tensor representation if its space is a direct sum of subspaces and factor spaces of tensor spaces. A main result of the present paper is that for a finite field k, the k-group ring of G has a faithful tensor representation. In paper I the representations afforded by all tensors of rank $m<2p$ were determined subject to the condition that k has more than p elements. In this paper the same is done for the field k with p elements. A main tool in this investigation is the construction of a representaton of G from each irreducible representation of the non-modular full linear group, and a corresponding extension of the Brauer-Nesbitt modular character theory to this case. The presence of zero divisors in the ring of polynomial functions over a finite field enters into the treatment of the case of tensors of rank $2p-1$ over a two-dimensional vector space, and the situation in that case should help point the way to the general decomposition theory. (Received October 1, 1943.)

Analysis

251. Stefan Bergman: *Fundamental solutions of partial differential equations of the second order.*

As was previously shown, for every differential equation $L(U)=U_{Z\bar{Z}}+H(Z, \bar{Z})U=0$, $Z=X+iY$, $\bar{Z}=X-iY$, there exists a function $\mathrm{E}(Z, \bar{Z}, t)=1+Z\bar{Z}t^2\mathrm{E}^*(Z, \bar{Z}, t)$ such that $U=\mathrm{P}(f)\equiv\int_{-1}^{+1}\mathrm{E}(Z, \bar{Z}, t)f(Z(1-t^2)/2)dt/(1-t^2)^{1/2}$, where f is an arbitrary analytic function, is a solution of $L(U)=0$ (see Duke Math. J. vol. 6 (1940) p. 537). The author shows that a fundamental solution $\Gamma(z, \bar{z}, \zeta, \bar{\zeta})$ of the equation $S(v)=v_{z\bar{z}}+F(z, \bar{z})v=0$ is given by $\mathrm{P}(1/2\pi)\log|Z|+G(Z, \bar{Z})$. Here $Z=z-\zeta$, $\bar{Z}=\bar{z}-\zeta$, and P is the operator introduced above for the equation $L(U)=0$ with $H(Z, \bar{Z})=F(Z+\bar{\zeta}, \bar{Z}+\bar{\zeta})$. $G(Z, \bar{Z})=-\int_0^Z\int_0^{\bar{Z}}D(Z, \bar{Z})dZd\bar{Z}+\int_0^Z\int_0^{\bar{Z}}H(Z, \bar{Z})(\int_0^Z\int_0^{\bar{Z}}D(Z, \bar{Z})dZd\bar{Z})dZd\bar{Z}+\cdots$ where $D(Z, \bar{Z})=(1/2)\int_{-1}^{+1}t^2[2\mathrm{E}^*+\bar{Z}\mathrm{E}^*_{\bar{Z}}+Z\mathrm{E}^*_Z]dt/(1-t^2)^{1/2}$. Using the representations of functions $v(z, \bar{z})$, $S(v)=0$, in the form of a line integral over a closed curve in terms of Γ, $\partial\Gamma/\partial n$, v and $\partial v/\partial n$ the author studies the growth of v and $\partial v/\partial n$ along circles $|z|=r$, $r\to\infty$. The existence of an analogous function $\mathrm{E}(X, Y, t)$ for every equation $H(U)=U_{XY}+H(X, Y)U=0$ (of hyperbolic type) has been established (see above reference). $(1/2\pi)\int_{-1}^{+1}\mathrm{E}(X, Y, t)dt/(1-t^2)^{1/2}$ is now shown to be the Riemann function of the equation $v_{xy}+F(x, y)v=0$, where $X=x-\xi$, $Y=y-\eta$ and $H(X, Y)=F(X+\xi, Y+\eta)$. Analogous relations hold for more general equations. (Received September 11, 1943.)