9. Sze-Tsen Hu, Proc. Cambridge Philos. Soc. vol. 43 (1947) pp. 314–320.
10. Hsein-Chung Wang, Proceedings Akademie van Wetenschappen, Amsterdam, vol. 50 (1947).
11. K. Reidemeister, *Topologie der Polyeder*, Leipzig, 1933.
12. S. Eilenberg, Ann. of Math. vol. 45 (1944) pp. 407–447.
13. ———, Fund. Math. vol. 32 (1939) pp. 167–175.
14. W. Hurewicz, Proceedings Akademie von Wetenschappen, Amsterdam, vol. 38 (1935) pp. 521–528.
15. K. Borsuk, Fund. Math. vol. 24 (1935) pp. 249–558.

MAGDALEN COLLEGE, OXFORD UNIVERSITY

TOPOLOGICAL CHARACTERIZATION OF FIELDS WITH VALUATIONS

DANIEL ZELINSKY[1]

1. **Introduction.** A topological field is a (commutative) field which is also a topological space satisfying the separation axiom T_0, and in which addition, subtraction and multiplication are continuous, two-variable functions. For our purposes it is unnecessary to assume that division is continuous.

If F is any field, topological or not, we define a (nonarchimedean) valuation of F to be a function v on F to a linearly ordered group Γ with the symbol 0 adjoined, such that

$$v(xy) = v(x)v(y), \tag{1}$$

$$v(x + y) \leqq \max [v(x), v(y)], \tag{2}$$

$$v(x) = 0 \text{ if and only if } x = 0, \tag{3}$$

for all x, y of F. It is understood that for every γ of Γ, $0 < \gamma$ and $0\gamma = \gamma 0 = 0$. Such a valuation of a field defines a topology, with respect to which F is a topological field, when we specify that the neighborhoods of 0 in F are the sets $U(\gamma) = [x \in F | v(x) < \gamma]$, one for each γ in Γ. If F was a topological field to begin with and the topology defined by the valuation is the same as the original topology of F, we say that the valuation preserves the topology of F.

The question we intend to answer is, "Which topological fields have valuations preserving their topologies?"

Presented to the Society, April 17, 1948; received by the editors January 21, 1948.

[1] This paper was written while the author was a National Research Fellow in Mathematics.