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A NON-ZERO DIMENSIONAL ATOM IN THE LATTICE OF UNIFORMITIES

by

J. Reiterman and V. Rödl

A uniformity $\mathcal{A}$ on a countable set X is exhibited such that $\mathcal{A}$ is an atom in the lattice of uniformities on X and such that $\mathcal{A}$ is non-zero dimensional. This solves a problem of [Pelant, Reiterman: Atoms in uniformities, Seminar Uniform Spaces, Prague 1975]. The example is based on a construction of a metric space (X, ρ) (X countable) with properties:

- (i) (X, ρ) is not uniformly discrete,
- (ii) There exists an ultrafilter $\mathcal{U}$ on X which has a basis consisting of uniformly homeomorphic copies of (X, ρ)
- (iii) The ultrafilter $\mathcal{U}$ from (ii) is selective w.r.t. all covers $\{P_i\}$ with $\sup \text{diam } P_i < \infty$.