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Measurements on domains and topology

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Abstract

The concept of a measurement on a continuous partial order has been recently introduced by Keye Martin. Measurement provides a uniform degree of approximation for elements of the kernal, i.e., those elements with measure zero. Measurement also induces a Scott topology for elements "near" the kernal. The results below are joint work with Keye Martin.

I. X is developable and *T˙1* iff it is the kernel of a measurement on a continuous poset, X is developable T_1 and choquet complete iff it is the kernal of a measurement on a continuous cpo.

II. For each developable T_1-space X, there exists a developable T_1-space *M(X)* with a poset order $<$ such that (1) X is the kernal of a measurement. (2) the topology on *M(X)* is exactly the topology induced by the measurement. (3) If X is *T˙2*, then *M(X)* is a Moore space. (4) If X is a complete (or even semi-complete) Moore space then *(M(X),<)* is a cpo. (5) If X is the real line, then *M(X)* is a non-normal Moore space. (6) (*MA + not CH*) If X is a subspace of the real line and *omega* $<$ *card(X)* $<$ *c*, then *M(X)* is a normal nonmetrizable Moore space.

III. The countable ordinals with the order topology is the top of a Scott domain, and is a G˙delta set with respect to the Scott topology on the domain. [This answers several questions open questions in the area.]

IV. Finally, we give a new recursion induction theorem for cpo's using measurement theory.

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