

**2018 International Conference on  
Topology and its Applications,  
July 7-11, 2018, Nafpaktos, Greece**

# **ABSTRACTS**

**Department of Mathematics,  
University of Patras, Greece**



**2018 International Conference on  
Topology and its Applications,  
July 7-11, 2018, Nafpaktos, Greece**

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### **On dense subsets and projections of Tychonoff products**

**Mathematics Subject Classification (MSC): 54A25, 54B10**

**Abstract.** By well known Hewitt–Marczewski–Pondiczery theorem, the Tychonoff product  $\prod_{\alpha \in 2^\omega} X_\alpha$  of  $2^\omega$  many separable spaces is separable.

We consider the problem of the existence in the Tychonoff product of  $2^\omega$  many separable spaces a dense countable subset, which contains no nontrivial convergent in the product sequences.

In 1970 year W.H.Priestley proved that such countable dense set existsts in  $I^{2^\omega}$ , where  $I$  is closed unit interval.

In 1978 year P.Simon proved that such countable dense set existsts in  $D^{2^\omega}$ , where  $D$  is a two-point discrete space. He proved that in  $D^{2^\omega}$  there is a countable dense set such that the closure of every countable subset of it has a cardinality  $2^{2^\omega}$ .

In 2017 year we proved that that such countable dense set existsts in  $Z^{2^\omega}$ , where  $Z$  is a countable discrete space. We proved that in  $Z^{2^\omega}$  there is a countable dense set such that every countable subset of  $Q$  contains a countable discrete in  $Z^{2^\omega}$  subset.

Now we prove that such countable dense set exists in the general case of the product  $\prod_{\alpha \in 2^\omega} Z_\alpha$  of not one-point Hausdorff separable spaces.

In fact we prove that in  $\prod_{\alpha \in 2^\omega} Z_\alpha$  there is a countable dense set  $Q \subseteq \prod_{\alpha \in 2^\omega} Z_\alpha$  such that for every countable subset  $S \subseteq Q$  a set  $\pi_A(S)$  is dense in a face  $\prod_{\alpha \in A} Z_\alpha$  for some  $A$ ,  $|A| = \omega$ .

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### Classification of Continuous Function spaces on ordinals

**Mathematics Subject Classification (MSC): 54C35, 46E10**

**Abstract.** The topological classification of the spaces  $C_p[1, \alpha]$  is devoted to the Gorak's paper [1], in which the question of the homeomorphism of the spaces  $C_p[1, \alpha]$  and  $C_p[1, \beta]$  is solved for all ordinals  $\alpha$  and  $\beta$  with the exception of the case  $\alpha = k^+ \cdot k$ ,  $\beta = k^+ \cdot k^+$ , where  $k$  is the initial ordinal, and  $k^+$  is the smallest initial ordinal greater than  $k$ .

**Theorem 1.** *Let  $\tau$  be an arbitrary initial regular ordinal,  $\sigma$  and  $\lambda$  be initial ordinals satisfying the inequality  $\omega \leq \sigma < \lambda \leq \tau$ . Then the space  $C_p[1, \tau \cdot \sigma]$  is not homeomorphic to the space  $C_p[1, \tau \cdot \lambda]$ .*

If we combine this result with the results of [1], we get a complete topological classification of the spaces  $C_p[1, \alpha]$  (which coincides with the uniform classification). We can write it in the form of the following theorem.

**Theorem 2.** *Let  $\alpha$  and  $\beta$  be ordinals and  $\alpha \leq \beta$ .*

(a) *If  $|\alpha| \neq |\beta|$ , then  $C_p[1, \alpha]$  and  $C_p[1, \beta]$  are not homeomorphic.*

(b) *If  $\tau$  is an initial ordinal,  $|\alpha| = |\beta| = \tau$  and either  $\tau = \omega$  or  $\tau$  is a singular ordinal or  $\beta \geq \alpha \geq \tau^2$ , then the spaces  $C_p[1, \alpha]$  and  $C_p[1, \beta]$  are (uniformly) homeomorphic.*

(c) *if  $\tau$  is a regular uncountable ordinal and  $\alpha, \beta \in [\tau, \tau^2]$ , then the space  $C_p[1, \alpha]$  is (uniformly) homeomorphic to the space  $C_p[1, \beta]$  if and only if*