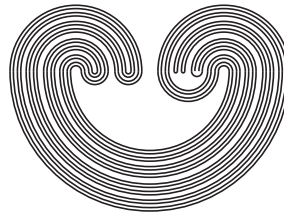


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## ON CONTINUOUS POLYNOMIALS OF THE MACÍAS SPACE

by

JHIXON MACÍAS

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**Mail:** Topology Proceedings  
Department of Mathematics & Statistics  
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**E-mail:** [topolog@auburn.edu](mailto:topolog@auburn.edu)

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## ON CONTINUOUS POLYNOMIALS OF THE MACÍAS SPACE

JHIXON MACÍAS

*To my wife and our first child*

**ABSTRACT.** Let  $\mathbb{N}$  be the set of natural numbers. The Macías space  $M(\mathbb{N})$  is the topological space  $(\mathbb{N}, \tau_M)$  where  $\tau_M$  is generated by the collection of sets  $\sigma_n := \{m \in \mathbb{N} : \gcd(n, m) = 1\}$ . In this paper, we characterize the continuity of polynomial and exponential functions over  $M(\mathbb{N})$ ; and prove that the only continuous polynomials are monomials, and that the only continuous exponential functions are of the form  $f(x) = a^x$ .

### 1. INTRODUCTION

In 1953, M. Brown introduced a topology  $\tau_G$  on the set of natural numbers  $\mathbb{N}$ , which is generated by the collection of arithmetic progressions  $b(\mathbb{N} \cup \{0\}) + a$  where  $a, b \in \mathbb{N}$  such that  $\gcd(a, b) = 1$  (here the symbol  $\gcd(a, b)$  means the greatest common divisor of  $a$  and  $b$ ). In [14, Counterexample 60] the topology  $\tau_G$  is called the *relatively prime integer topology*. It was not until 1959 that the topology introduced by Brown was popularized by S. Golomb (now known as Golomb's topology) who in [7] proves that Dirichlet's theorem on arithmetic progressions is equivalent to the set of prime numbers being dense in the topological space  $(\mathbb{N}, \tau_G)$ .

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