5th IFSCOM2018 ABSTRACT BOOK
ISBN: 978-605-68670-1-9

IFSCOM2018
5th Ifs And Contemporary Mathematics Conference
September, 05-09, 2018, Kahramanmaras, Turkey
pp:19-19

COUNTERFLOW WAVES IN A COMBUSTION MODEL

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ABSTRACT

We study combustion waves that occur when air is injected into a porous medium containing initially some solid fuel. We proved the existence of traveling waves for a system of three partial differential equations that give temperature, oxygen and fuel balance laws. In [1], the existence of various combustion waves was proved by using phase plane analysis under the assumption that the combustion wave velocity is positive. In [2] oxygen and heat are both transported at the same velocity and the existence of counterflow waves was proved. In this work, we assume that oxygen is transported faster than temperature, which is physically more realistic and we consider the negative combustion wave speed and prove the existence of counterflow combustion waves. We also identify all possible generic wave sequences that solve boundary value problems

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2000 *Mathematics Subject Classification.* 34H10, 37N35, 93C42.
Key words and phrases. Counterflow combustion wave, Traveling wave,Porous media.