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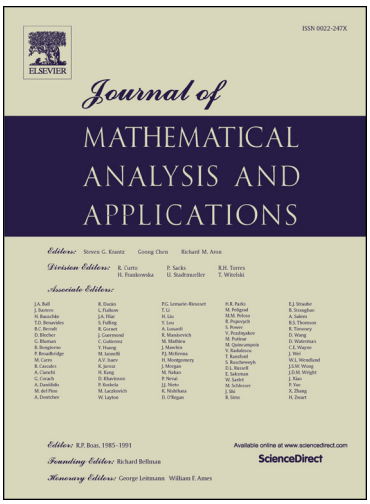

Global analysis of a mathematical model for hepatitis C considering the host immune system

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GLOBAL ANALYSIS OF A MATHEMATICAL MODEL FOR HEPATITIS C CONSIDERING THE HOST IMMUNE SYSTEM

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Abstract. A mathematical model is considered in order to analyze the dynamics of hepatitis C virus (HCV) and the host immune system. This model is based on a system of four differential equations. By using geometric tools, enough conditions are determined in terms of the parameters that guarantee the global stability of the endemic equilibrium.

Key-words: Hepatitis C, Global stability, Endemic equilibrium.

1. Introduction

Hepatitis C is a disease that mainly affect the liver. It is caused by the hepatitis C virus (HCV). The acute infection is generally asymptomatic, but the chronic infection (50-70% of the cases) might produce liver damage, and about 20% of the patients get cirrhosis ten years after being infected [9].

The HCV is mainly caused through the blood, some rare cases by sexual contact and rarely from mother to her baby. Approximately from 130 to 150 millions of people around the word are infected by HCV (2015)[1].

Nowadays, there is no vaccine against HCV. The current treatment consists in eliminating the viral load using interferon and ribavirin for 48 weeks. The treatment cures about half of the cases, but it frequently has secondary reactions that can be mortal. There are some procedures to evaluate the hepatic lesion; one of them is the liver biopsy which was the best tool for years to monitor the evolution of the hepatic disease. Its use has decreased because it is very aggressive procedure for the patient. The measure of the viral load is a new resource that allows to know the intensity of the infection.

Mathematical models have been used in order to understand the HCV dynamics. Some of them have successfully explained the changes of the viral load in patients with hepatitis C virus infection [4, 2, 6, 7, 8, 12, 17].

Date:

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[1]http://www.who.int/mediacentre/factsheets/fs164/es/

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