EXISTENCE OF PULSES
FOR A REACTION-DIFFUSION SYSTEM
OF BLOOD COAGULATION

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Abstract. The paper is devoted to the investigation of a reaction-diffusion system of equations describing the process of blood coagulation. Existence of pulse solutions, that is, positive stationary solutions with zero limit at infinity is studied. It is shown that such solutions exist if and only if the speed of the travelling wave described by the same system is positive. The proof is based on the Leray–Schauder method using topological degree for elliptic problems in unbounded domains and a priori estimates of solutions in some appropriate weighted spaces.

1. Introduction

Hemostasis is a physiological process which aims to prevent bleeding in the case of blood vessel damage. It includes vasoconstriction, platelet plug formation and blood coagulation in plasma with the formation of fibrin clot. In this work we will focus on the blood coagulation process. A malfunction in this process can lead to thrombosis or to various bleeding disorders. The process of blood coagulation has three main stages: initiation, amplification and clot growth arrest. They are determined by chemical reactions in plasma between different proteins (blood factors), among which the most important role is played by thrombin.