A simple isothermal model for homogeneous-heterogeneous reactions in boundary-layer flow. I Equal diffusivities

M.A Chaudhary
Department of Applied Mathematics, University of Leeds, LS2 9JT, UK

J.H Merkin
Department of Applied Mathematics, University of Leeds, LS2 9JT, UK

Received 29-NOV-94
in revised form 13-APR-95

A simple model for homogeneous-heterogeneous reactions in stagnation-point boundary-layer flow is constructed in which the homogeneous (bulk) reaction is assumed to be given by isothermal cubic autocatalator kinetics and the heterogeneous (surface) reaction by first order kinetics. The possible steady states of this system are analysed in detail in the case when the diffusion coefficients of both reactant and autocatalyst are equal. Hysteresis bifurcations leading to multiple solutions are found. The temporal stability of these steady states is then discussed.

Copyright (c) 1998 Elsevier Science B.V. All rights reserved.