

INFORMATION ON MASTER'S THESIS

1. Full name: **Hoang The Tuan**

2. Sex: male

3. Date of birth: 14/09/1983

4. Place of birth: Hung Yen

5. Admission decision number:

Date: 10/10/2008

6. Changes in academic process: no change

7. Official thesis title:

The existence of global solutions of an Activator-Inhibitor System

8. Major: Analysis

9. Code: 60 46 01

10. Supervisors:

Dr. Le Huy Chuan

Hanoi University of Science-Viet Nam National University

11. Summary of the findings of the thesis:

Let us consider the generalized Activator-Inhibitor system

$$\begin{aligned}\frac{\partial A}{\partial t} &= k_1 - k_2 A + k_3 \frac{A^p}{B^q} + D_A \Delta A, \\ \frac{\partial B}{\partial t} &= k_4 \frac{A^r}{B^s} - k_5 B + D_B \Delta B.\end{aligned}$$

A large number of papers have already been published for this system. When $p=r=2$, $q=1$, $s=0$, the global existence of solutions was first obtained by Rothe. Masuda-Takahashi proved the global existence of solutions for the general case, but they had to assume some restrictive conditions on the exponents p , q , r and s which excludes the case Rothe proved. Afterward, Li-Chen-Quin and Jiang got rid of such a restriction and proved the global existence in the case: $0 < p-1 < r$ and $\frac{p-1}{r} < \frac{q}{s+1}$. They also showed that if $r > p-1$ and $\frac{p-1}{r} > \frac{q}{s+1}$ or $0 < r < p-1$ then solutions will blow up in a finite time for some initial values.

However, there seems no study on the case: $\frac{p-1}{r} = \frac{q}{s+1}$ or $0 < r = p-1$. Following this direction, we study the global existence of solutions when $p=r=2$, $q=s=1$. We proved the global existence of solutions in a general functional space.

12. Practical applicability:

We apply this result to physical, chemical or biological systems.

13. Further research directions:

We will construct dynamical system determined from the Cauchy problem, show the existence of attractor, investigate the stability and instability of stationary solution, construct smooth stable and unstable manifold.

14. Thesis-related publications:

Date: 01/08/2011

Hoang The Tuan