**THESIS INFORMATION**

Thesis title: “Some class of degenerate parabolic equations with logarithmic nonlinearity: Blow-up, global existence and decay properties”

Speciality: Mathematic Analysis

Code: 62460102

PhD Student: Lê Công Nhàn

Academic year: 2016-2019

Supervisors:

* Supervisor 1: Assoc Prof. PhD. Lê Xuân Trường, University of Economic HCM City
* Supervisor 2: PhD. Huỳnh Quang Vũ, University of Science – VNU.HCMC

1. ABSTRACT:

My thesis studies some qualitative properties of solutions such as: blow-up, global existence and decay of solutions of the following three initial-boundary value problems for some degenerate parabolic equations:

**Problem 1:** We consider the initial-boundary value problem for the p-Laplacian equation with logarithmic nonlinearity



where  with 

**Problem 2:** We consider the initial-boundary value problem for the pseudo parabolic equation involving the p-Laplacian operator with logarithmic nonlinearity



where  with 

**Problem 3:** We consider the initial-boundary value problem for the doubly nonlinear diffusion equation



where  with  ­

2. NEW RESULTS OF THESIS:

**The results of Chapter 2:** We first prove the existence and uniqueness of weak solution. And then using the potential well method to prove the global existence and blow-up of solution. To this aim, we construct the stable and unstable sets *W* and *U* and prove that the solution exists globally if it starts in  Moreover, if the initial energy  with  being less than the mountain pass level  then the global solution decays algebraically. Our final result show that if  and  then the solution blows up in finite time.

**The results of Chapter 3:** We first prove the existence and nonexistence of weak solution based on the conditions on the parameters *p* and *q.* In which we show that the blow-up phenomena only occurs when  Then by using the variational method and fibrering map we construct two disjoint stable and unstable sets  and . The difficulties occur in this chapter due to the appearance of the nonlinearity  with . So to handle this problem we need more sophisticated mathematical technique than the previous chapter. Finally we prove that the solution exists and decays algebraically whenever it starts from  and blows up in finite time whenever it begins from *U.*

**The results of Chapter 4:** By using similar methods as in the previous chapters but we are deal with more difficulties because of the appearance of more parameters. In this chapter, we first prove the existence and nonexistence of global solutions depending on the parameters *p, q* and *m*.Our first result shows that the necessary condition for the blow-up phenomena is  We next prove that the solution exists and decays algebraically whenever it starts from *W* and blows up in finite time whenever it begins from *U.* Finally in the critical case  we show that the problem possesses global and decay solution when  and blow-up solution when 

3. THEORECTICAL/ PRACTICAL APPLICATIONS OR OPEN QUESTIONS

In the thesis we merely consider the case . So one of the open questions that can be study further is to study the qualitative properties of solutions in the case high initial energy

|  |  |
| --- | --- |
| **SUPERVISOR** | **PhD STUDENT** |

**CONFIRMATION OF THE UNIVERSITY OF SICENCE**

**VICE PRESIDENT**