

# INFORMATION OF A DOCTORAL THESIS IN ENGINEERING

Name of PhD candidate: **Vu Duc Binh**

Name of thesis: "**Researching the motive force of industrial machine hands under the influence of interactive force from environment**".

Major: Mechanical Engineering

Code: 9.52.01.03

Full name of the scientific supervisors:

**1. Dr. Phan Dang Phong**

**2. Prof.Dr.Sc. Do Sanh**

Training institutions: National Research Institute of Mechanical Engineering –  
Ministry of Industry and Trade

## SUMMARY OF NEW CONCLUSIONS IN THESIS

### **1. Scientific significance of thesis**

Research results have scientific implications as follow:

- Building a model of surveying the connection mechanism of industrial robot arm;
- Set up the motion equations system of industrial robot arm when there existed joint gap;
- Set up equations to calculate the program movement error and examine their influence on the accuracy of the actual operation of the robot's arm when under the impact of the environment.

### **2. Practical significance**

+ By modeling the dynamics of the machine, simulating the process, propose a method of "early integration of the system" to minimize the dynamics of the systemic dynamics;

+ Simulation results, solving the problem of mechanical dynamics are applied in improving the accuracy and durability of hands in reality.

### **3. New contributions of the thesis**

- Proposing a version to model machine hands with rotary joints have gap;
- Proposing a version to model the machine with elasticity by compact weight method and equivalent stiffness;
- Establishing expressions to determine kinetic error due to joint gap and elastic deformation;
- Establishing the dynamic equations elastic grip when the handle has mass and has't mass;
- Proposing the interaction force's model between operation and environment stages in case of dependence on speed.

*Hanoi, May 20<sup>th</sup>, 2019*

**Supervisor group**

**PhDcandidate**

**Dr. Phan Dang Phong    Prof.Dr.Sc. Do Sanh**

**Vu Duc Binh**