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## Particle Swarm Optimization

### 3.1. Introduction

optimization problem

#### 3.2.1. Problem framework

time domain specifications

#### 3.2.3. Expressions of frequency domain specifications

#### 3.2.4. Analysis of the optimization problem

### 3.3. Particle swarm optimization implementation

### 3.4. PID tuning optimization

#### 3.4.1. Case study: magnetic levitation

## Sommario/riassunto

The classic approach in Automatic Control relies on the use of simplified models of the systems and reformulations of the specifications. In this framework, the control law can be computed using deterministic algorithms. However, this approach fails when the system is too complex for its model to be sufficiently simplified, when the designer has many constraints to take into account, or when the goal is not only to design a control but also to optimize it. This book presents a new trend in Automatic Control with the use of metaheuristic algorithms. These kinds of algorithm can optimize any cr