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Some of the aspects of decision design in development of the intelligent wire casting machine

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Abstract

The process of microwire casting can be one of the methods of nanotechnology and advanced materials. The objective of this paper is to discuss the problem of decision design in the development of an intelligent machine for casting of microwire. The paper presents the decision making structure and describes its elements for microwire production based on direct casting from the melt. The most important element of the decision making structure is given by the drop model. According to this, important details of the model are discussed. The results presented here are intended to be used in the decision support system design for building of the intelligent casting machine.

1 Introduction

It is a fact, that innovative technologies are the engines of a competitive economics. Obviously, industrial technologies are very important for such economics. It is well-known, that most of modern technological processes are automated. But there are industrial applications where human presence is essential given the complexity of the technologies. For instance, in continuous casting of glass-coated microwires ([3]) it is not possible to dispense with manual intervention because of high complexity of the casting process. Such technologies require online recognition of the process and online decision making. In this context, it is important the development of advanced techniques in order to optimize industrial information systems with human in the loop. Such a system is concerned with all personnel, equipment, software, processes and knowledge to provide data for decision making structure. This structure should provide how the system will evolve, how far the best performance is, what actions should be undertaken.

The paper discusses the problem of decision design in the development of the intelligent wire casting machine. Some of the aspects of online analysis and decision making problem in continuous casting of glass-coated microwires are discussed in ([4]). Our purpose is to develop some of the preliminary results presented in ([4]). Next section describes the structure of decision making for the process of microwire production based on direct casting from the melt. The most important element of the decision making structure is given by the drop model. According to this, the last section develops the subject of the drop model.