

CYBER MODEL OF ELECTRONIC COMMERCE ACUSTOMER CENTRIC

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Abstract: *This paper describes how to implement methods of cybernetics into the economy. The mathematical model was created in MATLAB software. Created model works with two feed backs, which are realized through question forms. The goal of this model is to decrease difference between demand and offer.*

Keywords: *Electronic Commerce, Strategy, Technology, Marketing, E-commerce, Business to Customer, Business to Business.*

JEL Classification: *C52, C67, L21, M15.*

1. Introduction

This paper aims to create a model of e-business, focusing on customer needs. The result of solving this problem is the creation of a model where the selected dynamic processes are examined. Addressing of the strategic management of e-commerce in the company, is focused primarily on customers. It is very important to make a survey of the entire company, to learn its business decisions and obtaining information not only about the market, but also in internal affairs. Among the results belong the characteristics of company strategy and information characterization, which are based on a commercial (business) corporate strategy and corporate strategy quality, or other strategies. The strategy is continually evaluated at certain intervals and adapted to current requirements. Using MATLAB software an economic model of electronic commerce is designed. For the actual model Simulink as a special toolbox for modeling cybernetic systems is used.

2. Formulation of the problem

2.1 Description of the company and the customer's first order equation

The proposed model describes the behavior of consumer and company by transfer function of the first order. Transfer functions of consumer's subsystems and subsystems of the company have only a demonstration transmissions. It is not a case where the behavior of these subsystems are precisely identified.

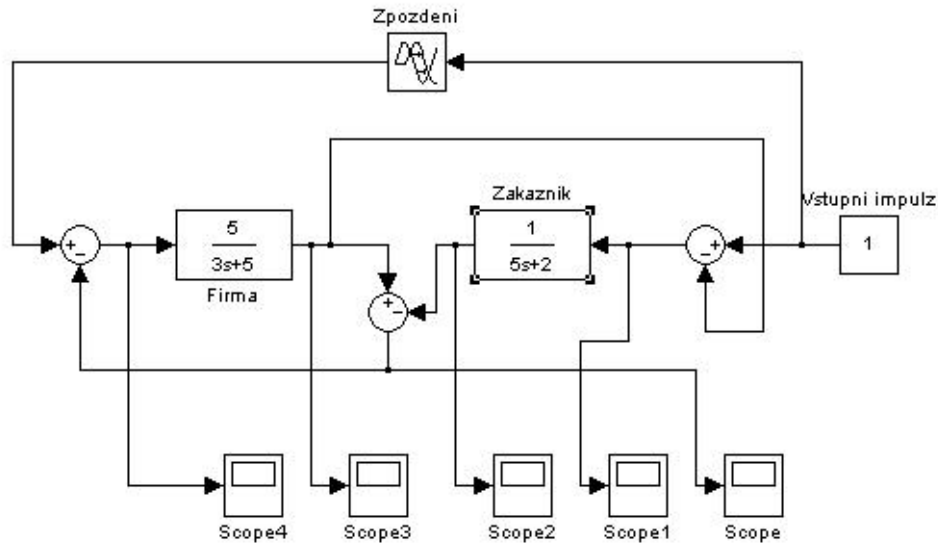


Fig. 1: Simplified model depicting the involvement of a time lag

Source: (Own processing)

2.1.1 General description of the blocks used

- Step (pulse input)

The element that generates a step signal of the change from zero to one or to a demanded value. In the economic model, this element generates a signal of the customer who has already chosen the company (business) and runs the whole model.

- Transfer Function (Customer / Company)

A part of the model, which defines the behavior of a firm and a customer, using transfer functions. When creating a model, the behavior description of several options, such as neural network and fuzzy logic, can be used.

- Summation

The element that ensures the implementation of the feedback.

- Time Delay

The element that creates a time delay. In this model it realizes the waiting time of the company before a modification of offer according to customer needs starts.

- Scope

Element, which graphically shows the changes of the parts of the whole model that depend on time.

Priority is given to the customer, restrictive terms of production values in this business segment for the products in the menu to meet customer requirements are described. This model has the transfer functions in a simplified form to be able to

examine how consumers can influence the dynamics in terms of production, how rapidly production can be adapted to customer requirements.

2.1.2 Processes of individual stages of the first order model

The below stated graphs show the system stage/state variables versus time. Individual plots belong to elements in the SCOPE Figure 1

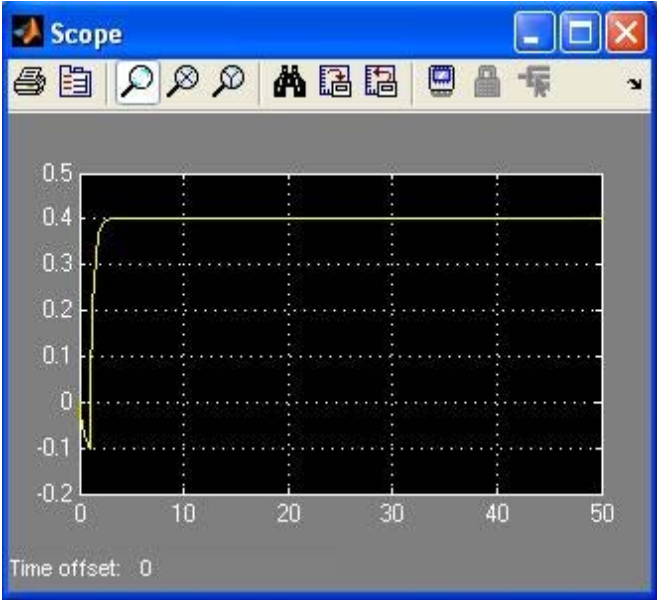


Fig. 2: SCOPE

Source: (Own processing)

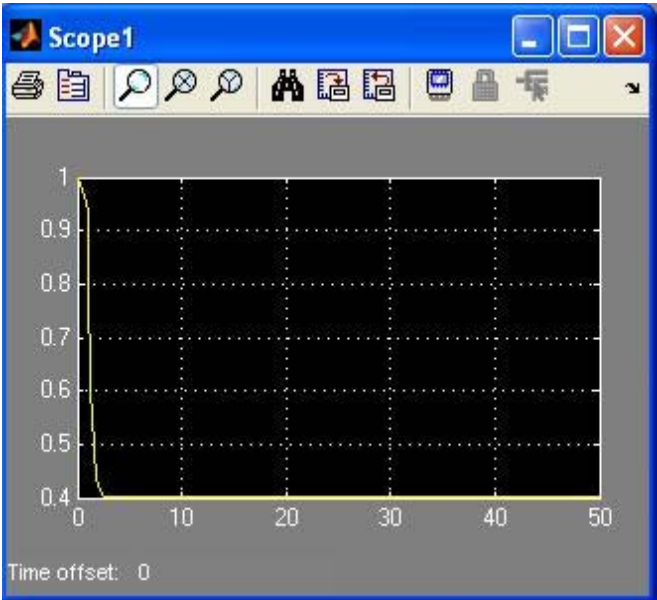


Fig. 3: SCOPE

Source: (Own processing)

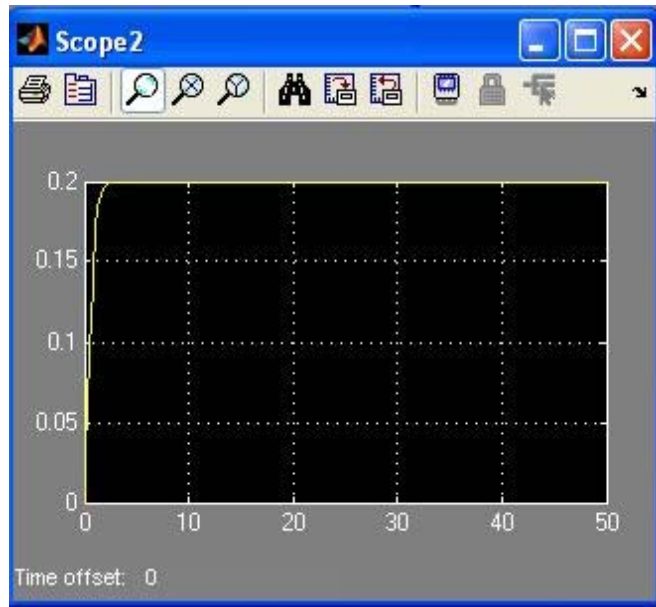


Fig. 4. SCOPE

Source: (Own processing)

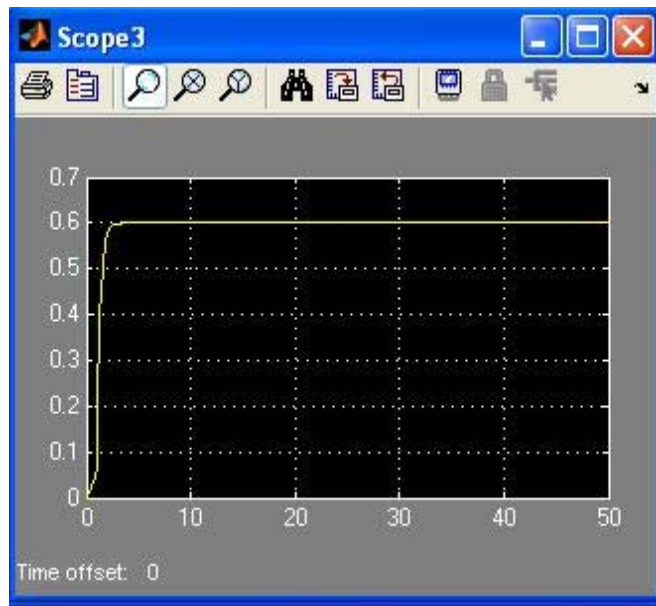


Fig. 5: SCOPE

Source: (Own processing)

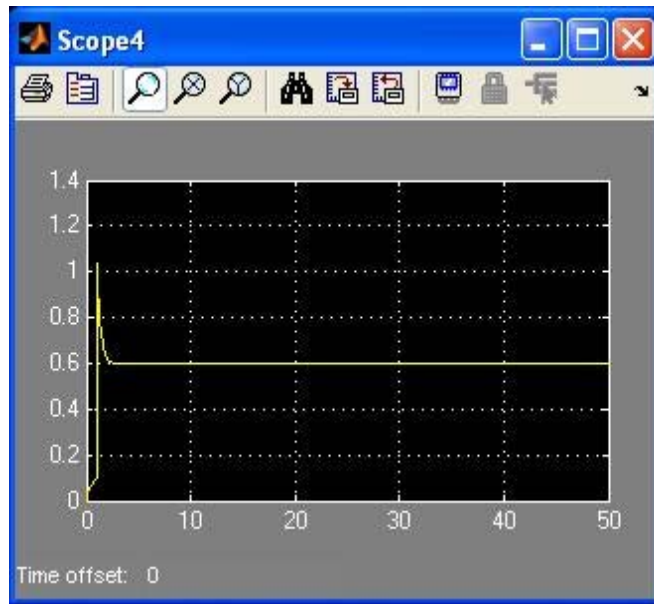


Fig. 6: SCOPE

Source: (Own processing)

Graphs show the behavior of a cybernetic model of electronic commerce in various stages. Stocks represent a part of a system variables, depending on the time. The amount of the customers must be assessed on the basis of system throughput.

For the company's strategy it is complicated to satisfy customers needs by electronic commerce in real time.

- SCOPE 4: Shows real (customer's) demand for a product in the company. This affects the production. Query execution system retains its value.
- SCOPE 3: An expression of the running production ability to realize the demand request. A stabilization will occur, the demand/ requirement is fulfilled.
- SCOPE 2: Shows the way of customer's options, that can affect the production (a customer over an idea, the company realizes).
- SCOPE 1: A (feed-back) correction of customer demands (according) to the production ability.
- Scope: A satisfaction of customer demands/ requirements in term of all internal relations between company and customer, e.g. in term of:
 - the production of the company,
 - the customer's needs and their's corrections,
 - the firm possibilities.

2.2 Description of the company and the customer's by equations

Another proposed model describes the behavior of the customer and the company by second-order transfer function. Transfer functions of consumer and company subsystems have only the demonstration type of transmissions. It is not the case of precisely identified behavior of these subsystems.

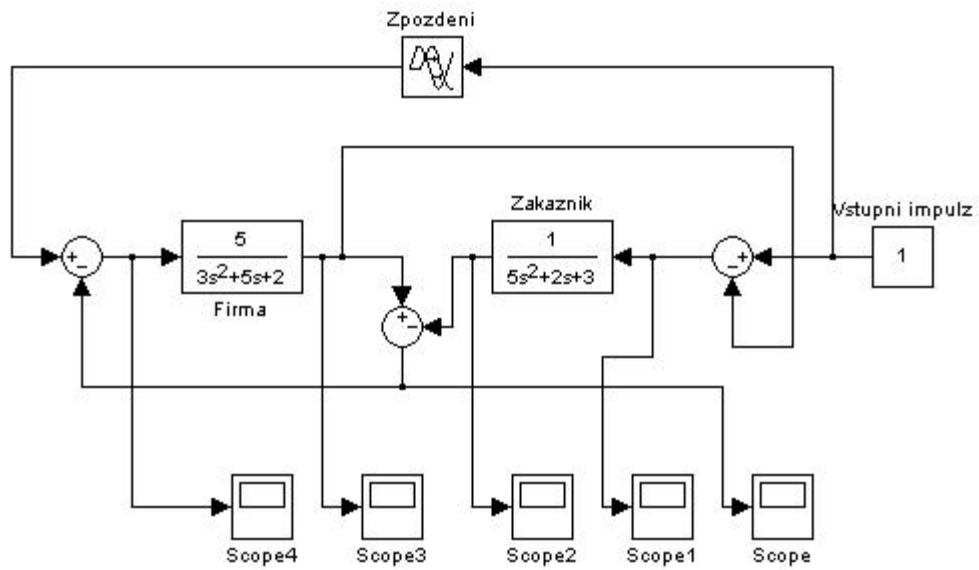


Fig. 7: Simplified model depicting the involvement of a time lag

Source: (Own processing)

2.2.1 The progress of the individual states of the second-order model

The graphs below show the state of value system parts in relation to time. Individual plots belong to elements in the SCOPE Figure No. 7

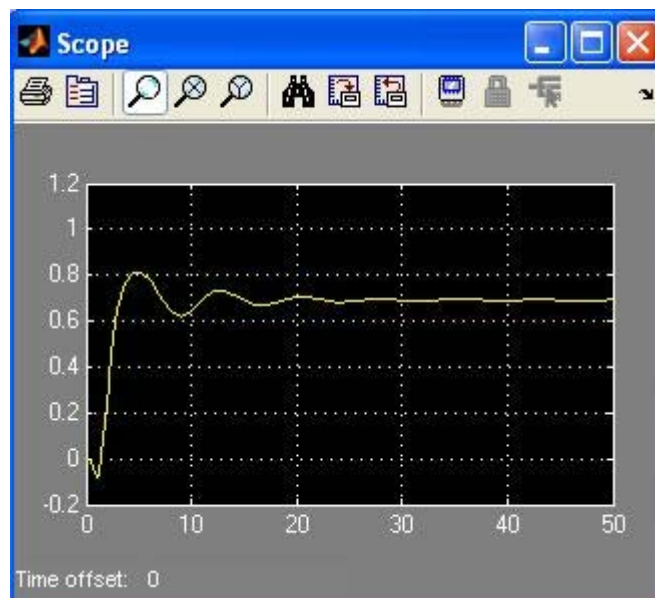


Fig. 8: SCOPE

Source: (Own processing)

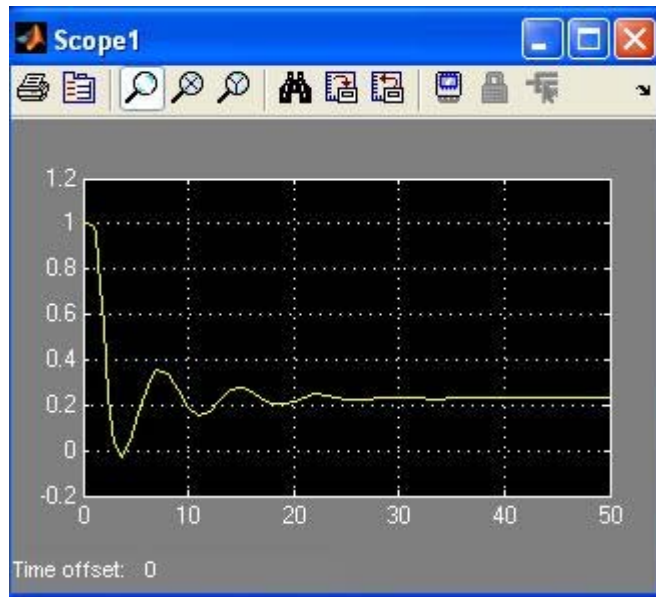


Fig. 9: SCOPE

Source: (Own processing)

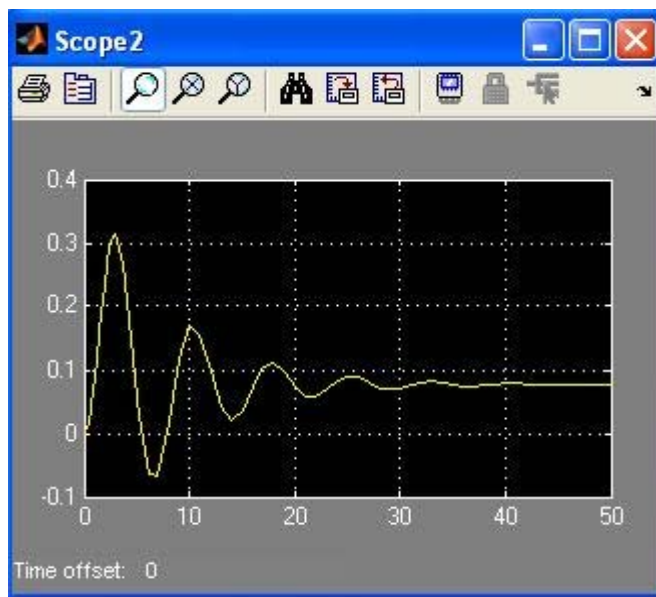


Fig. 10: SCOPE

Source: (Own processing)

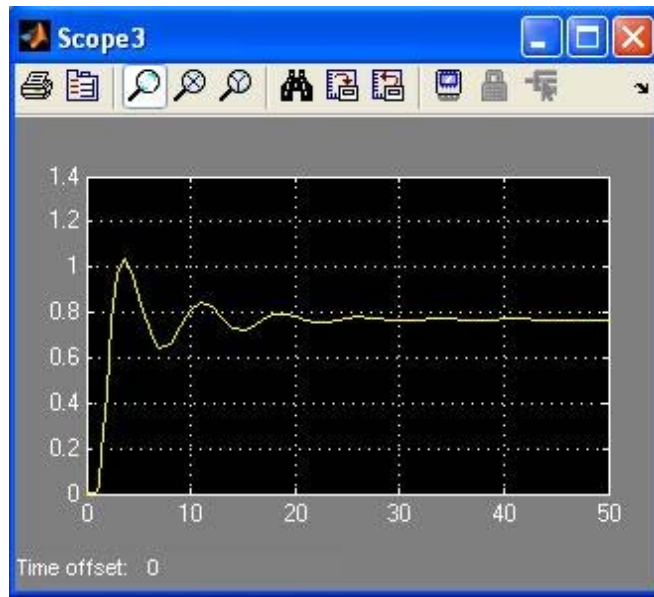


Fig. 11: SCOPE

Source: (Own processing)

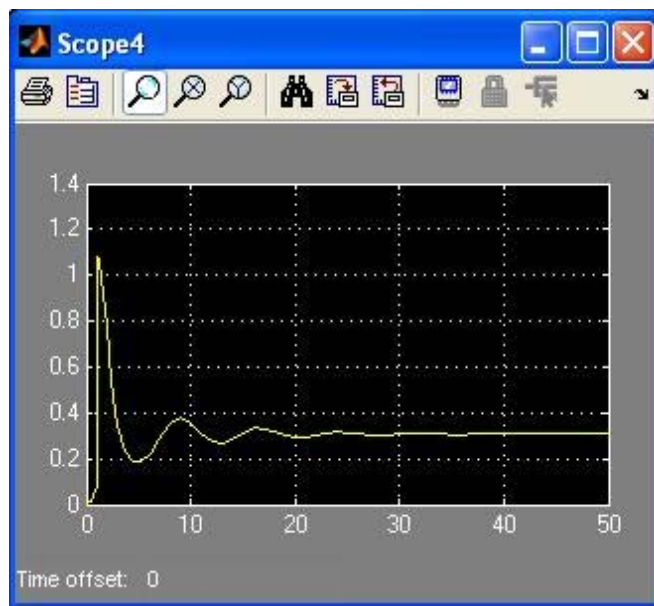


Fig. 12: SCOPE

Source: (Own processing)

2.2.2 The possibilities how to identify the customer and the company

The above mentioned system is composed of the subsystems, which are not exhaustive in description of the behavior. This is not an accurate description of the behavior of particular subjects. The identification itself is in the middle of Economics a difficult task. The MATLAB software contains several toolboxes that make work easier by modeling of particular subsystems. Neural networks, fuzzy sets, etc. can be used.

3. Solving the problem

The simplest way to address these needs, is to map the dynamic properties of a strategy and to determine the transient response. In cases in which it is impossible to get re-course characteristics, the frequency response can be used. The acquirement of it is more difficult. To obtain the transient response of regulated system an abrupt change in the so-called action variables and fall is used. The response of the regulated system - the course of the controlled variable - is measured. From this step response can be obtained the possibility to determine the quantities characterizing the dynamic properties \rightarrow degrading strategies such as - for example - time and speed of adaptation response to new conditions.

In the case of the frequency response a harmonic signal is applied to the input of investigated member. The model examines in which extent the steady state of response by selection of goods Unit jump can be seen for example as a reaction to the news in the market. An entry into the model depends on the needs and requirements of the customer due to his understanding, A strategy of purchase follows. Transmission properties of individual subsystems, in particular customers demands, should be expressed as a result of the statistical examination of the two segments (ie, production and customer needs). This approach characterises a new point of view on the possibilities how to model the needs of the strategic management of e-commerce in the company.

4. Conclusion

The system created by using MATLAB software and toolbox SIMULINK creates an economic system model of e-commerce focused on the customer's feedback. The aim of the company is, by using feedback, to adjust its current offer to customer requirements. The system does not address the customer's choice of the company. It only enables the company offer specification and reduces the difference between customer demand and company offer. The problem of economic systems is the large number of measurable and unmeasurable inputs and a sensitivity to the changes in initial conditions. It is important to quantify the system to the sufficient extent. The created model allowed the description of subsystems of the company and of the customer by transfer functions of the first and second order. On this level of the description complexity, the system has settled down in real time and the company has found a common plane with the customer to optimize the offer/ supply. On the higher level of the description complexity of the behavior, such as by using the 5th-order transfer equation, the system has began to show instability. The economic systems should be quantified enough for mathematical modelling. The system works only with model descriptions of company and customer behavior.

Further precisising of valuation of this model can be achieved by application of neural networks and fuzzy logic to identify the behavior of firms and customers.

References

- [1] BLAŽKOVÁ, M. *Jak využít internet v marketingu - krok za krokem k vyšší konkurenceschopnosti*. Praha. Grada. 2005. 156 s. ISBN 80-247-1095-1
- [2] DVOŘÁK, J. *Elektronický obchod*. Skripta VUT v Brně, FP. 2004. ISBN 80-214-2600-4.
- [3] DONÁT, J. *E-business pro manažery*. 1.vyd. Praha: Grada Publishing, 2000. 84 s. ISBN 80-247-9001-7.
- [4] FRIMMEL, M. *Elektronický obchod: právní úprava*. 1. vyd. Praha: Prospektrum, 2002. 321 str. ISBN 80-7175-114-6.
- [5] KEŘKOVSKÝ, M. DRDLA, M. *Strategické řízení firemních informací*. C.H.Beck Praha 2003. ISBN 807179-730-8
- [6] KEŘKOVSKÝ, M. *Moderní přístupy k řízení výroby*. Praha, C.H.Beck, 2001, ISBN 80-7179-471-6, 172 s.
- [7] KEŘKOVSKÝ, M., VYKYPĚL, O. *Strategické řízení – teorie pro praxi*. Praha, C.H.Beck, 2002, ISBN 80-7179578-X, 172 s.
- [8] KOLEKTIV AUTORŮ, *Elektronický obchod a EDI*, 1. vyd. Brno: UNIS publishing, 1996. 216 s.
- [9] KENNET C. LAUDON; CAROL GUERCIO TRAVEL, *E-commerce: Business, Technology, Society, Fourth Edition* , Prentice Hall 2008, ISBN: 0-13-600645-0 , 896
- [10] ŠPIRKO Š, KUPKA J. *Základy technické kybernetiky*. Akademia Ozbrojených síl generála M.R. Štefánika. Liptovský mikuláš. 2008, s. 286. ISBN 978-80-8040-375-7

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