

Contents

1	Flow Tasks in Networks in Crisp Conditions	1
1.1	Basic Concepts of the Flow Theory	1
1.2	Selecting of the Arc Capacities	2
1.2.1	Factors Leading to the Problem Statements in Fuzzy Conditions	3
1.3	Fuzzy Logic as the Main Tool of Dealing with Uncertainty	4
1.4	Flow Tasks in Transportation Networks	9
1.4.1	Maximum Flow Finding in a Network	9
1.4.2	Maximum Flow Finding in a Network with Nonzero Lower Flow Bounds	11
1.4.3	Minimum Cost Flow Finding in a Network	11
1.4.4	Minimum Cost Flow Finding in a Network with Nonzero Lower Flow Bounds	14
1.5	Flow Tasks in Dynamic Networks	15
1.5.1	Maximum Flow Finding in Dynamic Networks with Zero and Nonzero Lower Flow Bounds	15
1.5.2	Minimum Cost Flow Finding in Dynamic Network with Zero and Nonzero Lower Flow Bounds	17
1.6	Summary	19
	References	19
2	Maximum and Minimum Cost Flow Finding in Networks in Fuzzy Conditions	23
2.1	Maximum Flow Finding in a Network with Fuzzy Arc Capacities	23
2.2	Method of Fuzzy Calculations with Fuzzy Numbers	26
2.3	Maximum Flow Finding in a Network with Fuzzy Nonzero Lower and Upper Flow Bounds	33

2.4	Minimum Cost Flow Finding in a Network with Fuzzy Arc Capacities and Transmission Costs	45
2.4.1	Potential Method for the Minimum Cost Flow Finding in a Network with Fuzzy Arc Capacities and Transmission	47
2.5	Minimum Cost Flow Finding in a Network with Fuzzy Nonzero Lower, Upper Flow Bounds and Transmission Costs. . . .	59
2.6	Summary	74
	References	74
3	Flow Tasks Solving in Dynamic Networks with Fuzzy Lower, Upper Flow Bounds and Transmission Costs	77
3.1	Definition of the Fuzzy Dynamic Network	77
3.2	Maximum Flow Finding in Dynamic Network with Fuzzy Transit Arc Capacities	79
3.3	Maximum Flow Finding in Dynamic Network with Fuzzy Transit Nonzero Lower and Upper Flow Bounds.	92
3.4	Minimum Cost Flow Finding in Dynamic Network with Fuzzy Transit Arc Capacities and Transmission Costs.	109
3.5	Minimum Cost Flow Finding in Dynamic Network with Fuzzy Nonzero Lower, Upper Flow Bounds and Transmission Costs	135
3.6	Summary	158
	References	158
4	Implementing the Program for Solving the Flow Tasks in Networks in Fuzzy Conditions	161
4.1	Functional Purpose of Proposed Program Complex	161
4.2	Description of the Logical Structure of the Software Mode.	163
4.3	Preparing of Input Data Using GIS ObjectLand.	166
4.4	Summary	166
	References	166
	Conclusion	167

Flows in Networks Under Fuzzy Conditions

Bozhenyuk, A.V.; Gerasimenko, E.M.; Kacprzyk, J.;

Rozenberg, I.N.

2017, VIII, 168 p. 115 illus., Hardcover

ISBN: 978-3-319-41617-5