

Content

INTRODUCTION	37
LIST OF SYMBOLS AND ABBREVIATIONS	42
CHAPTER 1. Methods of analyzing residual phase and stress states of steel solids	47
1.1. Problem status	47
1.1.1. Mathematical models and methods for definition residual stresses	48
1.1.2. Quantitative description of residual phase and stress states	54
1.2. Specific volumes of phase components	62
1.3. The subject of research. Stages of simulation	81
1.4. Conclusions to the chapter	85
CHAPTER 2. Mathematical model and initial relations	87
2.1. Stages of simulation	87
2.2. Temperature field	91
2.3. Phase composition	101
2.3.1. initial prerequisites	101
2.3.2. Algorithm of calculation	107
2.4. Mechanical properties	111
2.5. Residual stresses	115
2.6. Structural deformation	121
2.7. Conclusions to the chapter	143
CHAPTER 3. Solution technique	145
3.1. Introduction	145
3.2. Computational aspects of the technique	145
3.3. Methods of numerical solution of heat continuity problems	164
3.4. Numerical definition of phase composition	168
3.5. Calculation of parameters characterizing the mechanical properties	170
3.6. Calculation of residual structural st	172
3.7. Conclusions to the chapter	183
CHAPTER 4. Definition and optimization of the residual phase and stress states of the plates	187
4.1. Initial prerequisites	188
4.2. Optimization tasks	191
4.2.1. Solution building technique	193
4.2.2. Optimization algorithm	194

4.3. Residual phase and stress state of the plate when heated by mobile sources of heat	196
4.3.1. One heat source	197
4.3.2. Two heat sources	202
4.3.3. Three sources of heat	209
4.4. Conclusions to the chapter	218
 CHAPTER 5. The influence of selected additional thermal and technological factors	221
5.1. Modeling. Calculation scheme for definition and optimization	221
5.2. Preheating	224
5.3. Concomitant heating	229
5.4. The influence of the value of the scattering parameter in the source	237
5.5. The influence of local insulation	240
5.6. Conclusions to the chapter	244
 RESULTS AND CONCLUSIONS	247
 LITERATURE	263
 SUMMARY	279