Modelling flow-induced vibrations of gates in hydraulic structures
Erdbrink, C.D.

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3.3</td>
<td>The arbitrary Lagrangian-Eulerian mesh</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>Multi-scale model for discharge control and flow impact</td>
<td>55</td>
</tr>
<tr>
<td>4.1</td>
<td>Introduction</td>
<td>55</td>
</tr>
<tr>
<td>4.2</td>
<td>Approach and method</td>
<td>56</td>
</tr>
<tr>
<td>4.2.1</td>
<td>General</td>
<td>56</td>
</tr>
<tr>
<td>4.2.2</td>
<td>Configurations of multi-gated structure</td>
<td>57</td>
</tr>
<tr>
<td>4.2.3</td>
<td>System model and gate control</td>
<td>58</td>
</tr>
<tr>
<td>4.2.4</td>
<td>Discharge model</td>
<td>61</td>
</tr>
<tr>
<td>4.3</td>
<td>CFD simulations</td>
<td>64</td>
</tr>
<tr>
<td>4.3.1</td>
<td>Model set-up</td>
<td>64</td>
</tr>
<tr>
<td>4.3.2</td>
<td>Analysis of simulation output: flow impact</td>
<td>66</td>
</tr>
<tr>
<td>4.4</td>
<td>Model validation</td>
<td>67</td>
</tr>
<tr>
<td>4.5</td>
<td>Results of test case simulations</td>
<td>69</td>
</tr>
<tr>
<td>4.5.1</td>
<td>Results of system and discharge model</td>
<td>69</td>
</tr>
<tr>
<td>4.5.2</td>
<td>Results of CFD simulations</td>
<td>72</td>
</tr>
<tr>
<td>4.5.3</td>
<td>Results of flow analysis</td>
<td>74</td>
</tr>
<tr>
<td>4.6</td>
<td>Model coupling tests</td>
<td>76</td>
</tr>
<tr>
<td>4.7</td>
<td>Conclusions of this chapter</td>
<td>78</td>
</tr>
<tr>
<td>5</td>
<td>Physical experiment</td>
<td>79</td>
</tr>
<tr>
<td>5.1</td>
<td>Preface</td>
<td>79</td>
</tr>
<tr>
<td>5.2</td>
<td>Introduction</td>
<td>79</td>
</tr>
<tr>
<td>5.3</td>
<td>Experimental set-up</td>
<td>81</td>
</tr>
<tr>
<td>5.4</td>
<td>Definitions</td>
<td>86</td>
</tr>
<tr>
<td>5.5</td>
<td>Measurement conditions and variation of parameters</td>
<td>87</td>
</tr>
<tr>
<td>5.6</td>
<td>Results of physical experiment</td>
<td>88</td>
</tr>
<tr>
<td>5.7</td>
<td>Comparison with other experimental results</td>
<td>91</td>
</tr>
<tr>
<td>5.8</td>
<td>Summary</td>
<td>91</td>
</tr>
<tr>
<td>5.9</td>
<td>Photographs from the experiment</td>
<td>91</td>
</tr>
<tr>
<td>6</td>
<td>Numerical simulation study of gate vibration</td>
<td>97</td>
</tr>
<tr>
<td>6.1</td>
<td>Introduction</td>
<td>97</td>
</tr>
<tr>
<td>6.2</td>
<td>Model set-up</td>
<td>97</td>
</tr>
<tr>
<td>6.3</td>
<td>Selected cases and model validation</td>
<td>100</td>
</tr>
<tr>
<td>6.3.1</td>
<td>Added mass validation</td>
<td>100</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>8.4.5</td>
<td>Discussion</td>
<td>152</td>
</tr>
<tr>
<td>8.5</td>
<td>Application of evolutionary system identification to experimental data</td>
<td>153</td>
</tr>
<tr>
<td>8.6</td>
<td>Genetic programming and symbolic regression</td>
<td>156</td>
</tr>
<tr>
<td>8.7</td>
<td>Conclusions and outlook</td>
<td>157</td>
</tr>
<tr>
<td>9</td>
<td>Inferring numerical algorithms</td>
<td>159</td>
</tr>
<tr>
<td>9.1</td>
<td>Introduction</td>
<td>159</td>
</tr>
<tr>
<td>9.2</td>
<td>Inferring solver algorithms</td>
<td>160</td>
</tr>
<tr>
<td>9.2.1</td>
<td>Introduction</td>
<td>160</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Background</td>
<td>162</td>
</tr>
<tr>
<td>9.2.3</td>
<td>Method for generating computational schemes by an evolutionary algorithm</td>
<td>164</td>
</tr>
<tr>
<td>9.2.4</td>
<td>Results and discussion</td>
<td>166</td>
</tr>
<tr>
<td>9.3</td>
<td>Conclusions</td>
<td>172</td>
</tr>
<tr>
<td>9.4</td>
<td>Reflection on the work in Chapters 8 and 9</td>
<td>172</td>
</tr>
<tr>
<td>10</td>
<td>Conclusions and perspectives</td>
<td>175</td>
</tr>
<tr>
<td>10.1</td>
<td>Collected conclusions</td>
<td>175</td>
</tr>
<tr>
<td>10.2</td>
<td>Reflection</td>
<td>176</td>
</tr>
<tr>
<td>10.3</td>
<td>Perspectives and recommendations</td>
<td>177</td>
</tr>
<tr>
<td>References</td>
<td></td>
<td>179</td>
</tr>
<tr>
<td>Publications</td>
<td></td>
<td>189</td>
</tr>
<tr>
<td>Summary</td>
<td></td>
<td>191</td>
</tr>
<tr>
<td>Samenvatting</td>
<td></td>
<td>193</td>
</tr>
<tr>
<td>Postscript</td>
<td></td>
<td>195</td>
</tr>
<tr>
<td>Curriculum vitae</td>
<td></td>
<td>198</td>
</tr>
</tbody>
</table>