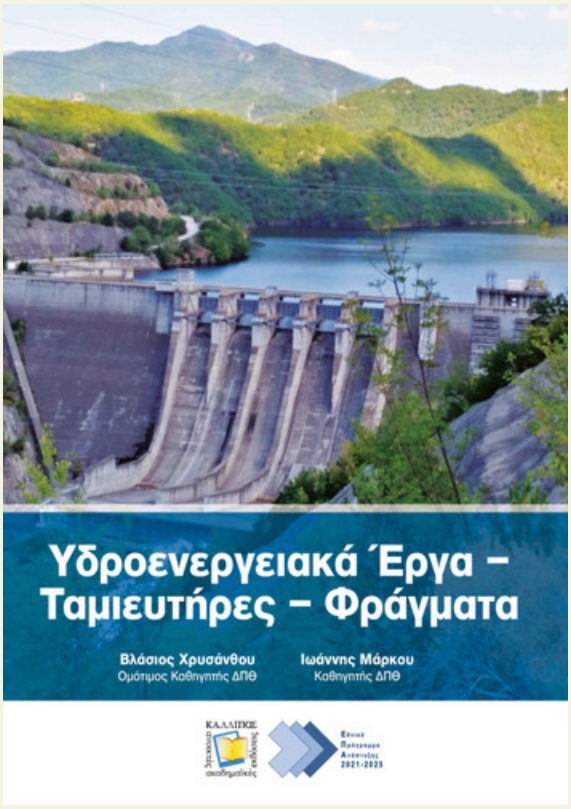

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Abstract

A hydropower plant is quite complicated, consisting mainly of the following components: reservoir, dam, and specific hydropower installations. The first chapter of the present book refers to the reservoirs. The dimensioning of both flood mitigation and storage reservoirs is emphasized. The dimensioning is regarding the reservoir capacity, as well as the safety systems, namely the flood spillway and the bottom outlet of the corresponding dam. Further, optimization methods are developed, which are divided into analytical (linear and dynamic programming) and simulation methods. Optimization concerns the maximization of the economic profit due to the water disposition to the users or the minimization of the material loss due to floods. Apart from that, estimation methods of water evaporation, thermal stratification and water quality of the reservoirs are given. Finally, the reservoir sedimentation problem is investigated and solution techniques are presented. The second chapter of this book concerns the design and construction of earth-fill and rock-fill dams. More specifically, the geotechnical investigation required and the proper construction materials are addressed. The necessary or alternative measures for the improvement of the foundation formation are outlined. Issues regarding the design and construction of filters and drains, as well as the water flow through the earth-fill dams are also covered in the second chapter. At this point, the dam stability analysis and the face sealings from reinforced concrete and asphaltic concrete are described. Finally, the instrumentation for the monitoring of the earth-fill and rock-fill dam behaviour concludes the second chapter. The third chapter of the book is dedicated to the concrete dams. The forces acting on the concrete dams are described and the corresponding formulas are written. The static stability analysis of the gravity, arch and buttress dams is also described. Finally, the flood spillways, as well as the stilling basins downstream of the dams are investigated from constructive and hydraulic points of view. The fourth chapter of the book begins with generalities about hydropower plants. The investigated specific installations of the hydropower plants include the surge chamber, the fall pipeline, where the phenomenon of hydraulic shock takes place, the spiral housing, the turbine and the turbine draft tube. The investigation of the above installations aims at their dimensioning.

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