

Thermal Use of Shallow Groundwater



**Fritz Stauffer, Peter Bayer, Philipp Blum,
Nelson Molina Giraldo, and Wolfgang Kinzelbach**



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Thermal Use Of Shallow Groundwater:

Thermal Use of Shallow Groundwater Fritz Stauffer, Peter Bayer, Philipp Blum, Nelson Molina Giraldo, Wolfgang Kinzelbach, 2013-12-12 The thermal use of the shallow subsurface is increasingly being promoted and implemented as one of many promising measures for saving energy A series of questions arises concerning the design and management of underground and groundwater heat extraction systems such as the sharing of the thermal resource and the assessment of its long term potential For the proper design of thermal systems it is necessary to assess their impact on underground and groundwater temperatures Thermal Use of Shallow Groundwater introduces the theoretical fundamentals of heat transport in groundwater systems and discusses the essential thermal properties It presents a complete overview of analytical and numerical subsurface heat transport modeling providing a series of mathematical tools and simulation models based on analytical and numerical solutions of the heat transport equation It is illustrated with case studies from Austria Germany and Switzerland of urban thermal energy use and heat storage and cooling This book gives a complete set of analytical solutions together with MATLAB computer codes ready for immediate application or design It offers a comprehensive overview of the state of the art of analytical and numerical subsurface heat transport modeling for students in civil or environmental engineering engineering geology and hydrogeology and also serves as a reference for industry professionals **Design of**

Heat Exchangers for Heat Pump Applications Marco Fossa, Antonella Priarone, 2020-12-28 Heat pumps HPs allow for providing heat without direct combustion in both civil and industrial applications They are very efficient systems that by exploiting electrical energy greatly reduce local environmental pollution and CO₂ global emissions The fact that electricity is a partially renewable resource and because the coefficient of performance COP can be as high as four or more means that HPs can be nearly carbon neutral for a full sustainable future The proper selection of the heat source and the correct design of the heat exchangers is crucial for attaining high HP efficiencies Heat exchangers also in terms of HP control strategies are hence one of the main elements of HPs and improving their performance enhances the effectiveness of the whole system Both the heat transfer and pressure drop have to be taken into account for the correct sizing especially in the case of mini and micro geometries for which traditional models and correlations can not be applied New models and measurements are required for best HPs system design including optimization strategies for energy exploitation temperature control and mechanical reliability Thus a multidisciplinary approach of the analysis is requested and become the future challenge

Advancements in Underground Infrastructures Manoj Khandelwal, Danial Jahed Armaghani, Ramesh Murlidhar Bhatawdekar, Pijush Samui, Saffet Yagiz, 2025-03-31 Advancements in Underground Infrastructures presents the advanced modelling tools and experimental techniques applied in underground infrastructure development It examines the usage of mathematical tools experimental techniques and data driven models as well as the latest technological advancements in underground engineering used to enhance the safety and stability of underground structures It also addresses the

application of the circular economy model in underground engineering Provides modelling theories in an easy to read format verified by on site models for various regions and scenarios Presents applications of soft computing tools and techniques in underground engineering Includes practical examples and case studies Colour versions of the figures in this book can be found at www.routledge.com 9781032373379 **Advanced Manufacturing and Automation X** Yi Wang, Kristian

Martinsen, Tao Yu, Kesheng Wang, 2021-01-22 This book presents selected papers from the 10th International Workshop of Advanced Manufacturing and Automation IWAMA 2020 held in Zhanjiang Guangdong province China on October 12 13 2020 Discussing topics such as novel techniques for manufacturing and automation in Industry 4.0 and smart factories which are vital for maintaining and improving economic development and quality of life it offers researchers and industrial engineers insights into implementing the concepts and theories of Industry 4.0 in order to effectively respond to the challenges posed by the 4th industrial revolution and smart factories Impacts of Shallow Geothermal Energy on Groundwater Quality

Matthijs Bonte, 2015-01-15 The use of shallow geothermal energy SGE systems to acclimatize buildings has increased exponentially in the Netherlands and worldwide In certain areas SGE systems are constructed in aquifers also used for drinking water supply raising the question of potential groundwater quality impact Impacts of Shallow Geothermal Energy on Groundwater Quality provides a hydrochemical and geomicrobial overview of the effects of ground source heat pumps and aquifer thermal energy storage The area is investigated with field and laboratory experiments and reactive transport models showing that shallow geothermal energy systems can influence groundwater quality in a number of ways Most prominent in open ground source heating systems operating at low temperature 20 °C is the physical mixing of deep and shallow groundwater of different quality distorting the natural water quality stratification in aquifers At a temperature of 25 °C and beyond certain trace elements were observed to mobilize in laboratory experiments and beyond 40 °C redox conditions change significantly while the microbial community shift towards a thermophilic community div Based on the results of this research guidelines are presented for monitoring and permitting of SGE systems The book is a useful resource for regulators of these systems water companies and installers of the SGE systems Author Matthijs Bonte Amsterdam The Netherlands

Heat Analysis and Thermodynamic Effects Amimul Ahsan, 2011-09-22 The heat transfer and analysis on heat pipe and exchanger and thermal stress are significant issues in a design of wide range of industrial processes and devices This book includes 17 advanced and revised contributions and it covers mainly 1 thermodynamic effects and thermal stress 2 heat pipe and exchanger 3 gas flow and oxidation and 4 heat analysis The first section introduces spontaneous heat flow thermodynamic effect of groundwater stress on vertical cylindrical vessel transient temperature fields principles of thermoelectric conversion and transformer performances The second section covers thermosyphon heat pipe shell and tube heat exchangers heat transfer in bundles of transversely finned tubes fired heaters for petroleum refineries and heat exchangers of irreversible power cycles The third section includes gas flow over a cylinder gas solid flow applications

oxidation exposure effects of buoyancy and application of energy and thermal performance index on energy efficiency The forth section presents integral transform and green function methods micro capillary pumped loop influence of polyisobutylene additions synthesis of novel materials and materials for electromagnetic launchers The advanced ideas and information described here will be fruitful for the readers to find a sustainable solution in an industrialized society **Salt Wells Energy Projects** ,2011 Energy Geotechnics Alessio Ferrari,Lyessse Laloui,2018-08-23 This book collects selected full papers presented at the International Symposium on Energy Geotechnics 2018 SEG 2018 held on 25th 28th September 2018 at the Swiss Federal Institute of Technology in Lausanne EPFL It covers a wide range of topics in energy geotechnics including energy geostructures energy geostorage thermo hydro chemo mechanical behaviour of geomaterials unconventional resources hydraulic stimulation induced seismicity CO2 geological storage and nuclear waste disposal as well as topics such as tower and offshore foundations The book is intended for postgraduate students researchers and practitioners working on geomechanics and geotechnical engineering for energy related applications **Carbon Free** ,2025-03-03 It s now or never The goal of achieving global climate neutrality is essential for ecological economic and social reasons and requires immediate and decisive action from politicians and society Carbon Free summarizes the building blocks we need to successfully manage the energy transition Replete with international examples the book s first part explores the transformation of the energy markets necessary accompanying redistributions the often neglected issue of global population development but also the ethical and political framework conditions under which the energy transition should take place Part II deals with sector specific topics including renewable energies heat pumps geothermal energy and solar thermal energy Levelized costs of energy in the context of innovation promotion and the financing method of project financing are presented The chapters in this part discuss implementation of strategic energy partnerships and how to shape future regulatory steps The book s third part then goes on to discuss the available toolbox with contributions on the technical and economic perspectives of green hydrogen grid infrastructures digitalization as well as the circular economy This book will benefit both scholars and practitioners with its unique overview of the elements that need to be taken into account in order for the energy transition to succeed *Ground Water Pollution* Vijay P. Singh,Ram Narayan Yadava,2003 *Cenozoic Geology and Geothermal Systems of Southwestern Utah* ,1994 Proceedings of Golden Jubilee Seminar on Exploration Geophysics in India ,1999 Papers presented at a seminar organized by the Geological Survey of India during November 14 16 1995 at Calcutta Riparian Ecology and Management in Multi-land Use Watersheds Parker Jamison Wigington,Robert L. Beschta,2000 *Groundwater Exploitation in the High Plains* David E. Kromm,Stephen E. White,1992 In the forty years since the invention of center pivot irrigation the Nigh Plains aquifer system has been depleted at an astonishing rate Is the region now in danger of becoming the Great American Desert In this volume eleven of the most knowledgeable scholars and water professionals in the Great Plains insightfully examine the dilemmas of groundwater use They address both the

technical problems and the politics of water management providing a badly needed analysis of the implications of large scale irrigation Hydrology of the Stillwater Geothermal Area, Churchill County, Nevada David S. Morgan,1979 *Quarterly Bulletin* ,1994 Guide to Hydrological Practices World Meteorological Organization,2008 *Applications of Remote Sensing in Hydrology* William David Striffler,Diana Claire Fitz,1980 **Proceedings of Joint Indo-US Workshop on Remote Sensing of Water Resources** ,1978 **Workshop Report** ,

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