

## Special Issue

# Advanced Research in Mathematical Physics, 2nd Edition: Bäcklund Symmetries of Painlevé and Soliton Equations and Their Applications

### Message from the Guest Editor

Bäcklund transformations play a fundamental role in the study of nonlinear evolution equations. They originated in the late nineteenth century in differential geometry, in the work of Bäcklund, Darboux, and Bianchi. Although initially motivated by geometry, these transformations later acquired a much broader significance in the theory of nonlinear partial differential equations. In soliton theory, beginning with the work of Gardner, Greene, Kruskal, Miura, and Zabusky on the KdV equation, Bäcklund transformations became a major constructive tool. They provide an algebraic or differential mechanism for generating new solutions from given ones while preserving integrability. In particular, they allow the systematic construction of multi-soliton solutions and are closely connected with nonlinear superposition principles. This volume is devoted to developments in the theory and applications of Bäcklund transformations in the realm of soliton and Painlevé equations, with particular emphasis on methods for constructing new solutions, elucidating symmetry structures, and uncovering new integrable models and their properties.

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### Guest Editor

Prof. Dr. Henrik Aratyn

Department of Physics, University of Illinois at Chicago, 845 W. Taylor St., Chicago, IL 60607-7059, USA

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### Deadline for manuscript submissions

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## Mathematics

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*Mathematics*  
Editorial Office  
MDPI, Grosspeteranlage 5  
4052 Basel, Switzerland  
Tel: +41 61 683 77 34  
[mathematics@mdpi.com](mailto:mathematics@mdpi.com)

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### Editor-in-Chief

Prof. Dr. Francisco Chiclana  
School of Computer Science and Informatics, De Montfort University,  
The Gateway, Leicester LE1 9BH, UK

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