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Titolo	The Isogeometric Boundary Element Method / / by Gernot Beer, Benjamin Marussig, Christian Duenser
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Descrizione fisica	1 online resource (XIV, 335 p. 235 illus., 189 illus. in color.)
Collana	Lecture Notes in Applied and Computational Mechanics, , 1613-7736 ; ; 90
Disciplina	531 515.35
Soggetti	Mechanics Mechanics, Applied Mathematical models Computer simulation Solid Mechanics Mathematical Modeling and Industrial Mathematics Simulation and Modeling
Lingua di pubblicazione	Inglese
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Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Introduction -- The boundary integral equation -- Basis functions, B-splines -- Description of the geometry -- Getting geometry information from CAD programs -- Numerical treatment of integral equations -- Numerical integration -- Steady state potential problems -- Static linear solid mechanics -- Body force effects -- Treatment of inhomogeneities/inclusions -- Material non-linear behaviour -- Applications in geomechanics -- Viscous flow problems -- Time dependent problems -- Summary and outlook -- Appendix A: Fundamental solutions.
Sommario/riassunto	This book discusses the introduction of isogeometric technology to the boundary element method (BEM) in order to establish an improved link between simulation and computer aided design (CAD) that does not require mesh generation. In the isogeometric BEM, non-uniform rational B-splines replace the Lagrange polynomials used in

conventional BEM. This may seem a trivial exercise, but if implemented rigorously, it has profound implications for the programming, resulting in software that is extremely user friendly and efficient. The BEM is ideally suited for linking with CAD, as both rely on the definition of objects by boundary representation. The book shows how the isogeometric philosophy can be implemented and how its benefits can be maximised with a minimum of user effort. Using several examples, ranging from potential problems to elasticity, it demonstrates that the isogeometric approach results in a drastic reduction in the number of unknowns and an increase in the quality of the results. In some cases even exact solutions without refinement are possible. The book also presents a number of practical applications, demonstrating that the development is not only of academic interest. It then elegantly addresses heterogeneous and non-linear problems using isogeometric concepts, and tests them on several examples, including a severely non-linear problem in viscous flow. The book makes a significant contribution towards a seamless integration of CAD and simulation, which eliminates the need for tedious mesh generation and provides high-quality results with minimum user intervention and computing.