Preface

Special Issue on qualitative and
analytical methods in elasticity and plasticity

A mechanical engineer involved in analysis and design of structures and processes usually tends to focus on numerical methods such as FEM. However, there are at least three reasons that justify the development of qualitative and analytical methods for engineering applications. Firstly, programming errors easily occurs and accurate benchmark results are essential for the verification of existing numerical codes and the development of new numerical codes. Secondly, there are numerous boundary value problems that cannot be solved by means of standard numerical techniques and the development of new numerical techniques that might be capable of solving these problems requires an intensive analytical treatment before a reliable numerical technique can be proposed. Thirdly, even when obtainable in principle, accurate numerical solutions covering useful ranges of all relevant parameters would often not be worth computing for economical reasons by comparison with less expensive semi-analytic solutions that account for most important features of this or that structure or process. This is of special importance for design problems. Furthermore, neither the material, nor the geometry (at least, in process design) nor the friction can ever be closely specified. Therefore, mathematically accurate numerical solutions are not really demanded for some practical purposes.

The present special issue is devoted to qualitative and analytical methods in elasticity and plasticity. The papers included in this issue deal with both exact semi-analytic solutions and asymptotic analyses that can in general be used in conjunction with numerical techniques.

Guest Editor

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