

Chapter 12

Conclusion



The aim of this book has been to propose an energetic approach of the non-linear mechanics.

This approach is based on two main components: the free energy to describe the reversible behaviour and the pseudo potential of dissipation in order to define the irreversibility evolution.

At the global point of view, these two potentials can be replaced by the potential energy of the system and the dissipative function, the state variables being mechanical fields. In this framework, the evolution of the system has been studied. For plasticity, damage or fracture, the solution of the evolution problem has the same formally form, as solution of variational inequality.

Discussion of existence and uniqueness is performed and examples of evolution of non-linear behaviour are given.

The concept of energetic approach is also applied to non-linear homogenisation of composite materials, that general relationships between micro and macro quantities are then obtained.

Finally, some inverse problems in non linear mechanics, specially in elasto-plasticity, are then discussed.

This book contains not exhaustive approach of non-linear mechanics, simulation algorithm are not presented in this volume, but references are given where energetic concept are used. The proposed examples are mainly obtained as analytical solutions, they can be used as reference solution.

This book is an introduction to non-linear mechanics and should be a first step to understand its complexity.