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## Preface

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The conservation of historical and monumental buildings is a topic where the contribution of engineering is of fundamental importance. In this context, geotechnical and structural engineers cannot operate independently, as has also been illustrated in the famous Rankine Lecture by Jean Kerisel in 1974, which aroused great interest among the geotechnical community and a few years later led the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) to set up the Technical Committee on the Preservation of Monuments and Historic Sites. However, it should be noted that the contribution of engineers is generally viewed (and considered by the institutions responsible for safeguarding built heritage) from an exclusively technological perspective. The progress made over recent decades in the fields of construction materials and operational technologies in structural and geotechnical engineering has contributed to the conservation of historic buildings by applying reinforcement solutions that fail to respect traditional construction techniques and the original design concept of the structures. This approach to the consolidation of historic and monumental buildings weakened by their age does not respect the principle of preserving the memory of the building as material evidence of its era, which becomes irreparably lost, and is therefore contrary to the current approach to conservation, as well as the vision of Jean Kerisel, whose immense humanism and passionate love of the art of building in the past comes across very clearly in his beautiful books.

Furthermore, experience has shown that the addition of new materials often loses its efficacy over time and can even cause permanent damage to the works it was supposed to save.

In the geotechnical field especially, this type of intervention has gradually become more widespread over the last 60 years due to the development of new technologies. Micropiles (also known as root piles), which can be made through existing masonry structures, have been widely used to consolidate historic buildings damaged by the deformation of the soil or for the protection of structures generally considered to be at risk; the original shallow foundations are replaced by deep ones, which are not affected by the behaviour of the upper layers of the foundation soil, while the application of concentrated forces significantly alters the stress state of the overlying structure.

There are cases where interventions of this type are necessary to save a monumental building, as was the case for the Ponte Vecchio in Florence, when the Arno riverbed was deepened following the tragic flood of 1966. However, in many other situations, micropile underpinning is used without any real need, irreparably altering the historic building, just because it is a far simpler solution and, paradoxically, less expensive than looking for the cause of soil deformation and studying whether it could be resolved. In defence of this choice, it is often stated that the intervention is invisible; a purely visual conception of

conservation seems to prevail. Among the interventions carried out in the past on important monumental works, a conservation approach that respects the original construction features, as in the case of the Tower of Pisa, the Torre Ghirlandina in Modena and the Ponte Milvio in Rome, is rarely applied.

For almost two centuries, the conceptual assumptions underlying heritage conservation have been the subject of debate, modification, theoretical formulations and directives in conferences, institutions and international organisations, especially in Europe. It is therefore to be hoped that geotechnical engineers should be involved in, and take an active part in, the consolidation and conservation of historic building projects, not only offering passive support with their knowledge of advanced technologies.

This book examines the contribution of engineering in general and particularly of structural engineering to conservation issues, which is why it has been included in a series devoted to geotechnical problems, promoted by the Technical Committee on Preservation of Monuments and Historic Sites of ISSMGE. Geotechnical and structural engineering are inseparable elements of civil engineering, closely interconnected in seeking solutions to the frequently difficult problems raised by the preservation of the historical heritage, to which the author of the book, Salvatore D'Agostino, has dedicated most of his academic and professional life with great passion as Professor of Structural Engineering at the historic Federico II University of Naples. The book provides ample evidence of his experience and knowledge of cultural trends, conservation theories and guidelines in Italy and many other European countries. The section devoted to Italy undeniably occupies the lion's share, not just because this represents the bulk of his work, but also and above all because only Italy still preserves so much material evidence of the numerous civilisations that have emerged in its territory over a period of almost three millennia, and whose conservation is of crucial importance.

D'Agostino has a deep-rooted knowledge of traditional construction techniques and their evolution over the centuries and is passionately concerned about their conservation. It is in this spirit that, fifteen years ago, he founded the Italian Association for the history of engineering, of which he is president. I believe that reading this book can open up new horizons of knowledge in the field of the conservation of historic buildings.

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