

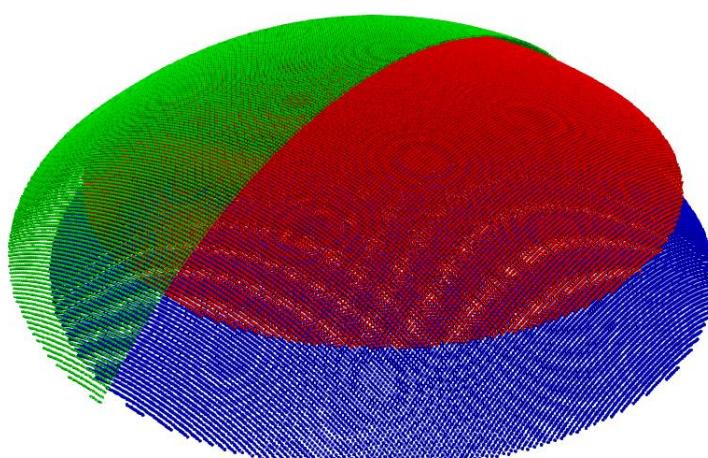
Anna Pandolfi

“Computational Continuum and Micromechanical Models for the Human Cornea”

The eye is a multi-component biological system, where mechanics, optics, transport phenomena and chemistry are strictly interlaced. The eye's response to external action is patient-specific and it can be predicted only by a customized approach, that accounts for the multiple physics and for the intrinsic microstructure of the tissues, developed with the aid of computational biomechanics. Our activity in the last years has been devoted to the development of a comprehensive patient-specific model of the cornea, able to simulate refractive intervention such as LASIK and SMILE. While the geometrical aspects are fully under control, the major difficulties are related to the characterization of the tissues, which require the definition of clinical in-vivo tests to complement known results of multiple ex-vivo tests. The interpretation of in-vivo tests is very complex, since the entire structure of the eye is involved and the characterization of the single tissue is not trivial, therefore the availability of micromechanical models constructed from the information given by diagnostic images of the eye represents a fundamental support for the characterization of the corneal tissues, especially in the case of pathologic conditions.



Anna Pandolfi is Professor of Structural Mechanics and Solid Mechanics at the Politecnico di Milano, where she has been hired in 1995 as assistant professor. Since 1996 Anna also holds an intermittent Visiting Associate Position at Caltech, Pasadena CA, USA. Major scientific contributions relate to the field of computational mechanics, such as the development of advanced fracture tracking techniques (cohesive elements, eigenerosion), particle methods for the discretization of solids and fluids, a new concept concrete with attenuation properties (metaconcrete), multiscale material models for porous brittle materials (brittle damage) used to simulate fracking. A second field of intensive research is biomechanics of soft tissues, applied in particular to the behavior of active tissues, muscles, intestines, and eyes. Anna is the editor in Chief of *Meccanica* (Springer) and in the Editorial Boards of six international journals. She is author or coauthor of more than 100 publications in international peer-reviewed journals and of approximately 50 scientific works of other nature.



Patient specific geometry of a cornea, including anterior (green), posterior (blue) surfaces and refractive interface (red) for LASIK surgery.