Marie Skłodowska Curie Action – Postdoctoral Fellowship 2023
Expression of interest – Hosting offer
(MSCA-PF-2023)

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Department /Institute /Centre	Departamento de Matemática Aplicada a las TIC ETSI de Sistemas Informáticos. Campus Sur.
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Research Area	Mathematics (MAT) Physics (PHY)
Brief description of the Centre/Research Group	The researcher can take a look at the web page of the IP Professor Jose Merodio: https://jmerodio.etsisi.upm.es/ and google scholar https://scholar.google.com/citations?user=gcGeqFoAAAAJ The researcher will work in a group with actually six Phd students in an applied math department. The group provides an interdisciplinary environment dealing with analytical and computational techniques within constitutive modelling in applied mathematics, dealing with aspects such as tumors or arteries among others.
Project description	Analytical and Computational Modelling with application in biomechanics. Lines of research: -Cancer Mechanics A tumor refers to an abnormal growth of cells and can be harmless (no cancer) or dangerous (with cancerous cells). The attempt to give a unified description of what a tumor is from a mathematical viewpoint- as well as from other points of view- is still hopeless because there are too many different types of tumors with different origins and characteristics. Nevertheless, new discoveries relating too many and diverse areas of cancer research make advanced mathematical modeling necessary to elucidate and interpret the experimental findings, as it has just been mentioned previously. The kinematics (and, in general, mechanics) of large deformations associated with growth is still an open problem. Needless to say that major concern has also been the need to develop constitutive laws (mathematical models of material behaviour), and this remains a key requirement. Such laws are needed in the formulation and solution of boundary-value problems of relevance to clinical procedures and should account for the diverse properties of different tissues. Part of our effort is dedicated to understand these aspects. -Biomechanics of soft tissue The overall aim of the research is to improve understanding of the (nonlinear) mechanics of biological soft tissue such as arterial wall tissue, with particular reference to the influence of growth, adaptation and residual stress on the mechanical response. We analyze these aspects combining a micromechanical and a

	macromechanical approach. In our analysis, we incorporate the effects of the microstructure, material properties for the fibers and embedding matrix, as well as the effects of damage (porosity) and residual stresses arising as a consequence of tissue growth. -Bifurcation and buckling of arteries We develop analytical and numerical methods to understand, analyze and capture structural instabilities. We have paid attention to buckling as well as postbuckling of different instabilities modes such as helical buckling and bulging.
Applications: documents to be submitted and deadlines	The application must include CV, letter of motivation, and the names of three posible references. **Deadline: 30/04/2023**