UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

DIPARTIMENTO DI MATEMATICA

IL DIRETTORE

Seminari di Matematica

Nell'ambito delle attività di ricerca coordinate dal **Prof. Luciano Lopez**,

la **Prof.ssa Paola Francesca Antonietti**,
del Dipartimento di Matematica del Politenico di Milano,
Direttrice del Laboratorio di Modellistica e Calcolo Scientifico (MOX) del PoliMI,

terrà presso il Dipartimento di Matematica
dell'Università degli Studi di Bari Aldo Moro,
la conferenza dal titolo:

"Mathematical Modeling of the Human Brain: from Physiology to Neurodegenerative Diseases"

il 25 gennaio 2024 alle ore 15.30 in aula VI

Abstract:

Neurodegenerative diseases (NDs) are complex disorders that primarily affect the neurons in the brain and nervous system, leading to progressive deterioration and loss of function over time. A common pathological hallmark of NDs is the accumulation of disease–specific misfolded aggregated proteins in different areas of the brain (e.g., Aβ and tau in Alzheimer disease, α–synuclein in Parkinson disease). In this talk, first, we discuss the mathematical and numerical modeling of the misfolding process of NDs. We present suitable mathematical models (based on Fisher–Kolmogorov equations) and discuss their numerical discretization based on high-order discontinuous Galerkin methods on polytopal grids (PolyDG). Numerical simulations in patient-specific brain geometries reconstructed from magnetic resonance images are presented. In the second part of the talk, we present a comprehensive mathematical model of the multiphysics flow of blood and Cerebrospinal Fluid in the brain. The model, consisting of a coupled system of Multiple-Network Poroelastic Theory (MPET) and Stokes' equations, describes the functioning of the brain's waste clearance mechanism, which has been recently discovered to play an essential role in the onset and progress of NDs. We propose the discretized formulation, prove its theoretical properties, and present numerical results on patient-specific brain geometries.

La S.V. è cordialmente invitata a partecipare.

Bari,12.01.2024

F.to Prof.ssa Anna Maria CANDELA

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