SEMINARIO

"PROFESOR FÉLIX MONDÉJAR"

DPTO. DE MATEMÁTICA APLICADA Y ESTADÍSTICA

CONFERENCIA

"Solving Hamilton-Jacobi PDEs by minimizing residuals of monotone discretizations using neural networks"

PONENTE: **CARLOS ESTEVE YAGÜEU**

Universidad de Alicante

FECHA : **Jueves, 5 de marzo de 2026**

HORA: **11,00h.**

LUGAR: Sala de I+D+I del Dpto. Puerta Nº B028 – P. Baja del Edif. de la ETSII – Campus Muralla del Mar

RESUMEN:

In recent years, advancements in deep learning and new optimisation algorithms have motivated the use of artificial neural networks to solve non-linear problems in high-dimensional setups. One of the crucial steps during the implementation of any deep learning method is the choice of the loss functional, which is used to train the neural network parameters, typically through a gradient-based method. In this talk, I will consider the approximation of the viscosity solution for Hamilton-Jacobi equations by means of an artificial neural network. I will discuss the choice of the loss functional, which should be such that any critical point approximates the viscosity solution. I will present some recent results concerning loss functionals involving a consistent and monotone numerical Hamiltonians. Using the numerical diffusion built in the numerical Hamiltonian, we are able to prove that any critical point solves the associated finite-difference problem and, therefore, approximates the viscosity solution. Moreover, I will show that by using discretizations with strong monotonicity properties, one can speed up the training process. I will also discuss possible extensions of the method to address other PDEs and dynamical systems.