Università degli Studi di Udine

Dottorato di Ricerca in Scienze dell'Ingegneria Energetica e Ambientale

Seminari del Corso di Dottorato

Multi Objective Design Optimization: From algorithms to processes

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Abstract: Suitable combination of different optimization technologies can be used to tackle challenging design problems. For instance, an approach that uses a multi-objective genetic algorithm, a neural network, and a gradient-based optimizer can be successfully applied to the design of a sailing yacht fin keel, coupling the optimization codes to 3D Navier–Stokes simulations and performing the multi-objective optimization task on parallel computers. In this talk we will introduce the basic concepts of multi-objective design optimization, also known as Pareto optimization, an area of multiple-criteria decision making that is concerned with mathematical optimization problems involving more than one objective function to be optimized simultaneously. Afterwards, we will provide an overview of practical applications and processes in which multi-objective optimization algorithms have been successfully employed, e.g. to seek the set of Pareto optimal solutions that maximise the airfoil lift and minimise the drag of airfoils or to better understand the preliminary design criteria of an aeronautical gas turbine for which different mission specification must be fulfilled.

CV: Carlo Poloni is Professor of Mechanical Engineering at the University of Trieste and President of ESTECO, which he co-founded ESTECO in 1999. He previously worked at Aeritalia and Sincrotrone Trieste and joined the University of Trieste as a researcher with a focus on Multidisciplinary Design Optimization. He has authored more than 100 papers and collaborates with international companies and organizations. He is founder member of AISE, the Italian Association of Systems Engineering, affiliated to INCOSE.