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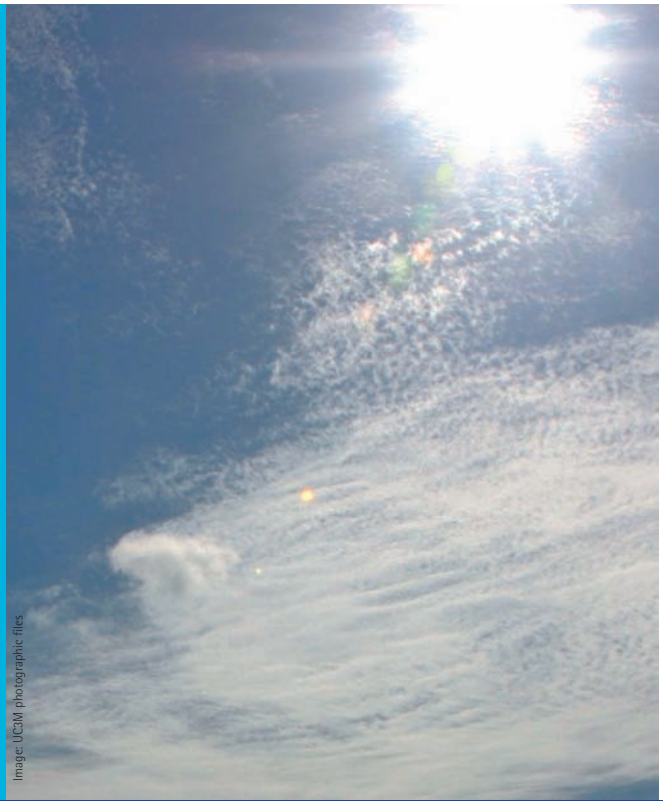
RESEARCH GROUPS

ITEA

THERMAL ENGINEERING, ENERGY AND ATMOSPHERE

GROUP



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Solar Panels

The **Thermal Engineering, Energy and Atmosphere Group (ITEA),** led by Dr. Antonio Lecuona Neumann and Dr. Pedro A. Rodríguez Aumente, is formed by a group of 8 technology-oriented experts with extensive experience in scientific disciplines, innovation, development and engineering studies. The members of the group combine diverse knowledge and experience, sharing a common denominator: offering effective services in a broad technological spectrum. It also has expert collaborators in fundamental analytical and numerical techniques, which provides the group with an internationally verified solidity.

•RESEARCH LINES•

- **Cooling and air conditioning**, especially with systems having a low environmental impact and high energy efficiency. Innovative absorption systems with electric integration. Energy recovery, residual heat recovery and heat pumps.
- **Solar thermal energy** of low and medium temperature for DHW, heating and cooling. Simulation of renewable energy systems.
- **Use of biomass gasified in microturbines by** ultra-low pollution LPP combustion.
- **Auditing, diagnosis and energy optimization studies** of buildings and systems, particularly embedded electronics and in underground enclosures. Thermal control.
- **Environmental acoustics and aeroacoustics.** Detection of sources and minimization of the sound emission.
- **Jet dynamics and two-phase heat and mass transfer.** IR emission of hot jets and microturbojets. Hypermixing.
- **Advanced laser instrumentation for the measurement** of sprays, large drops, flows with local and global velocimetry and combustion: PDA, LDV, stereo-PIV, high-speed video.
- **Computerized bench test** of heat exchangers, refrigerating machines, piston motors, turbomachines and micro jet engines.
- **Computer simulation** of flows of industrial and environmental interest.

•OUTSTANDING COLLABORATIONS AND R&D&I PROJECTS•

The ITEA group has more than 30 years of experience in external collaborations in consultancy and R&D. Its main partners and clients include institutions and companies from various industrial sectors. Aerospace sector: EADS (CASA), INTA, SENER, ITP, ONERA, AIRBUS, ESA, DLR, NLR, CIRA, QINETIC; Environmental sector: La Ley, University of Rome, La Sapienza; Electric sector: Unión FENOSA, Endesa, Energylab; Energy sector: IDAE, CIEMAT, BESEL, APINA; capital equipment: MERAK, CARSBAD; Naval sector: SENER, INSEAN; Defense: CIDA.

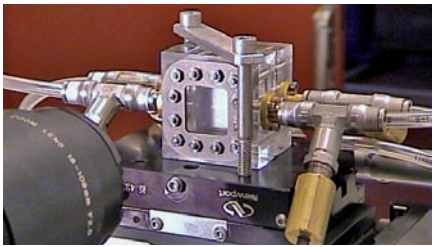
Experimental studies of Jets

Some of the most relevant R&D&I projects of the group are:

· Integrated Solar Cold Advanced Absorption with Electricity integration.
Funding Entity: Ministry of Science and Innovation. Date: 2010-2012.

· ABSYS.
Funding Entity: Universidad Carlos III de Madrid. Date: 2009-2010.

· Advanced Lithium Nitrate-Ammonia Absorption Machines (AVANSOR)
Funding Entity: Universidad Carlos III de Madrid. Date: 2009-2011.



Heat Micro exchanger

· Innovative Techniques for Efficient Cold Production with Solar Energy and Absorption Machines.
Funding Entity: Community of Madrid, Universidad Carlos III de Madrid. Date: 2007-2008.

· TERMOPIV. Combustion and Heat Transfer Analyzed with Advanced PIV.
Funding Entity: Ministry of Education and Science. Date: 2006-2010.

· Application to the Solution of Lithium Nitrate-Ammonia.
Funding Entity: Ministry of Education and Science. Date: 2005-2008.

· CoJeN: Computation of Coaxial Jet Noise.
Funding Entity: European Commission. Date: 2004-2007.

· PivNet 2 - A European collaboration on development, quality assessment, and standardization of Particle Image Velocimetry for industrial applications.
Funding Entity: European Commission. Date: 2002-2007.

• INNOVATIVE TECHNOLOGICAL SOLUTIONS •

Particle Image Velocimeter of high spatial resolution and time reconstruction: LFC PIV and DYNAMIC PIV.

Absorption chillers driven by low temperatura waste heat and solar thermal power with integration with grid electricity.

Absorption machine: Test bench of components for ammonia

•SCIENTIFIC-TECHNICAL SERVICES•

The ITEA group places at the disposal of the companies:

- Human and technical resources which are able to provide real and practical solutions to problems of multi-sector industrial interest.
- Capacity to act as a group, like an environmental and technological advisory, consultancy and R&D office, in the atmospheric field.
- Prototype development.
- Design engineering projects.
- Customized specialized training.

•TECHNOLOGICAL EQUIPMENT•

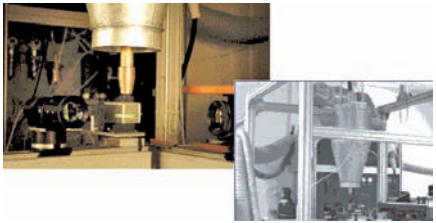
- Supply of seeded, compressed air, up to 10 bar and 800 K and 500 g/s.
- Testing of engines of up to 200 kW with the capacity to evaluate the indicated cycle and energy balance.
- Combustion chamber of up to 200 kW with propane.
- Field of flat and flat vacuum solar collectors of 50 m^2, with the support of a condensing boiler, computerized and feeding a 35 kW YAZAKI absorption machine and Climatewell of 10 kW. Heat and cold storage systems.
- Absorption machine with a 17 kW ROBUR boiler.
- 4 m^3 cryogenic chamber.
- Stereoscopic particle image velocimetry system with a high spatial (LFCPIV) and temporal (Dynamic PIV) resolution.
- Laser Doppler interferometer with phase information (PDA).
- High-speed image analysis in digital video.
- Reverberating chamber for the measurement of sound power, insulation, absorption coefficient and reverberation time. Sonometry and spectral analysis.
- Equipment for measuring polluting combustion gases.
- Numerical simulation with commercial and in-house developed codes.

· Weather station oriented to solar energy.

· Argon-ion, Neodymium-Yag and Helium-neon lasers

· Temperature and pressure calibrators. Stagnation probes.

· Temperature and humidity-controlled climatic chamber.



PDA: Laser Dopler Anemometry

Science Park Universidad Carlos III de Madrid
Technology Transfer Office
Tlf +34 916244023/4011 · Fax +34916244097
E-mail comercializacion@pcf.uc3m.es
Web www.uc3m.es

ITEA

Contact information

HEAD RESEARCHERS
Antonio Lecuona Neumann
Pedro A. Rodríguez Aumente

E-MAIL
lecuona@ing.uc3m.es
aument@ing.uc3m.es

WEB
http://www.uc3m.es/portal/page/portal/research/research_groups/itea

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