

# Curriculum Vitae

## INFORMAZIONI PERSONALI

**Nome** ROSARIO  
**Cognome** MARRETTA  
**Recapiti** Edificio 8, Ingegneria, DICAM, 09123896747  
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## FORMAZIONE TITOLI

Batchelor Aeronautical Engineering at University of Palermo on January 1986 magna cum laude and discussion of a thesis titled "Analysis and modeling of the dynamic response of a civil aircraft under blast effects".

After the call-up, since 1987 to 1988, research engineer at the Aertech Industries, Italy.

Since 1988 to 1990, chief research engineer at Tecnaïr Industries, Italy.

Winner of the Italian Minister of Scientific Research competition, on May 1992, as academic researcher in Fluid dynamic areas – at the Faculty of Engineering of University of Palermo (Department of Structural, Aerospace Engineering & Geotechnics).

Winner of the Italian Minister of Scientific Research competition, on December 2004, as associate professor in Fluid dynamic areas – at the Faculty of Engineering of University of Palermo (Department of Mechanical and Aerospace Engineering).

Since 1.1.2005 up today at the Department of Structural, Aerospace Engineering & Geotechnics at the Faculty of Engineering of University of Palermo

Since 1.1.2005 up today, associate professor of Aerodynamics and Aircrafts Aerodynamics teaching courses at the Faculty of Engineering of University of Palermo.

## ATTIVITA' DIDATTICA

### Chrono of academic activity

A. A. 2004-2005: Associate professor of Aircraft Aerodynamics and Aeronautical Systems

A. A. 2004-2005: Associate professor of Aircraft Aerodynamics (batchelor course)

A. A. 2005-2006: Associate professor of Aircraft Aerodynamics and Aeronautical Systems

A. A. 2005-2006: Associate professor of Aircraft Aerodynamics (batchelor course)

A. A. 2007-2013: Associate professor of Aerodynamics & Aircrafts Systems

## RICERCHE FINANZIATE

2004 (R.S. 60%): Induzione di flussi instazionari aerodinamici su strutture elastiche.

2005 (R.S. 60%): Modellazione e analisi di flussi turbolenti aeroacustici per veicoli terrestri da trasporto.

2006 (R.S. 60%): Progetto aeroacustico di treni ad alta velocità.

2006-2008 (Tutor research grant): Analisi e simulazione computazionale delle sollecitazioni aerodinamiche ed aeroacustiche generate nell'impatto di flussi turbolenti con elementi elastici e propulsivi.

## **ASSOCIAZIONI SCIENTIFICHE**

Reviewer of *Computers & Fluids Journal*.

Reviewer of American Institute of Aeronautics and Astronautics *AIAA Journal of Aircraft*.

Reviewer of *Journal of Neuroscience Methods*.

Reviewer of *Journal of Aerospace Engineering*

Reviewer of *Molecular & Cellular Biomechanics*

Reviewer of *CFD Journal*

Faculty Advisor of *American Institute of Aeronautics and Astronautics (AIAA)*.

Senior Member of *American Institute of Aeronautics and Astronautics (AIAA)*.

Member of Italian Association of *Aeronautics and Astronautics (AIDAA)*.

Lecturer of Master II Level (2007-2008) in Flight Safety Management of Sicilian Regional Assembly

Invited Professor @ Bath University UK (2013-currently)

## **PUBBLICAZIONE**

1 2009 Tartamella F, Marretta R (2009). Dispositivo a logica e componentistica elettronico-digitali per la acquisizione e accumulazione di energia elettrica spillata dal sistema meccanico-elettrico di un veicolo a combustione interna (Otto, Diesel, Brayton-Joule, Sabathè) alimentato da carburanti derivati dal petrolio (e non), biocombustibili, gpl e/o gas naturali.. PA20090000015, Personale

**Proveniente dal sistema gestione pubblicazioni: UNIPA con codice 10447/41685**

2 2009 MARRETTA R, F. TARTAMELLA (2009). Dispositivo a logica e componentistica elettronico-digitali per la acquisizione e accumulazione di energia elettrica spillata dal sistema meccanico-elettrico di un veicolo a combustione interna (Otto, Diesel, Brayton-Joule, Sabathè) alimentato da carburanti derivati dal petrolio (e non), biocombustibili, gpl, e/o gas naturali. PA2009A000015

3 2009 MARRETTA R (2009). Simulatore a piattaforma circuitale-digitale per la riproduzione funzionale e virtuale del funzionamento di cellula umana per applicazioni di laboratori di biologia e ricerca biologica. PA2009A000010

4 2009 Marretta R (2009). Simulatore a piattaforma circuitale-digitale per la riproduzione funzionale e virtuale del funzionamento di cellula umana per applicazioni di laboratori di biologia e ricerca biologica. PA2009A000010

**Proveniente dal sistema gestione pubblicazioni: UNIPA con codice 10447/43614**

5	2008	MARRETTA R (2008). Piattaforma digitale di controllo ottimo retroazionato delle evoluzioni di specie proteiche di cellule umane in presenza di danneggiamento del DNA e in fase di apoptosi. PA 2008 A 000027
6	2007	MARRETTA R, ORLANDO C (2007). PROCEDURA SISTEMATICA ED AUTOMATICA DI IDENTIFICAZIONE E RIMOZIONE DELL'ARTEFATTO PRESENTE NEI SEGNALI DI RISPOSTA DEL CERVELLO UMANO OTTENUTI DA STIMOLAZIONE ELETTROFISIOLOGICA PROFONDA. PA2007A000001, MARRETTA R., ORLANDO C.
7	2002	MARRETTA R (2002). Elica a bassa emissione aeroacustica a passo fisso e/o variabile con doppia anula e mozzo parzialmente intubato. Ufficio Italiano Brevetti e Marchi - Roma, 2002-2005
1	in press	MARRETTA R, LOMBARDI G. (in stampa). Aeroacoustic emission of light-loaded isolated propeller. JOURNAL OF FLUIDS ENGINEERING, ISSN: 0098-2202
2	in press	MARRETTA R, CAROLLO L., LOMBARDI G. (in stampa). BEM pre-processor for fully CFD post-processing of propeller hydroacoustic emission. COMPUTERS & FLUIDS, ISSN: 0045-7930
3	in press	MARRETTA R, CARLEY M., DARICELLO M., LOMBARDI G. (in stampa). Simulation of automotive cooling fan noise. COMPUTER MODELING IN ENGINEERING & SCIENCES, ISSN: 1526-1492

- 4 2010 Marretta R, Barbaraci G (2010). Digital control circuitry for the p53 dynamics in cancer cell and apoptosis. CENTRAL EUROPEAN JOURNAL OF BIOLOGY, ISSN: 1895-104X
- Proveniente dal sistema gestione pubblicazioni: UNIPA con codice 10447/41764***
- 5 2009 Marretta R, Orlando C, Carley M (2009). Adaptive BEM for Low Noise Propeller Design. THE OPEN ACOUSTICS JOURNAL, vol. 2, p. 20-30, ISSN: 1874-8376
- Proveniente dal sistema gestione pubblicazioni: UNIPA con codice 10447/56408***
- 6 2009 MARRETTA R, ORLANDO C, CARLEY M (2009). Adaptive BEM for low noise propeller design. THE OPEN ACOUSTICS JOURNAL, vol. 2, p. 20-30, ISSN: 1874-8376, doi: 10.2174/18748376009021
- 7 2009 MARRETTA R, ORLANDO C, CARLEY M (2009). BIE-Based aeroacoustic design procedure. INTERNATIONAL CONFERENCE ON COMPUTATIONAL & EXPERIMENTAL ENGINEERING AND SCIENCES, vol. 9 (4), p. 225-231, ISSN: 1933-2815

8	2009	<p>Marretta R, Orlando C, Carley M (2009). BIE-based aeroacoustic design procedure. INTERNATIONAL CONFERENCE ON COMPUTATIONAL &amp; EXPERIMENTAL ENGINEERING AND SCIENCES, vol. 9, p. 225-232, ISSN: 1933-2815</p> <p><b>Proveniente dal sistema gestione pubblicazioni: UNIPA con codice 10447/56406</b></p>
9	2009	<p>Marretta R, Daricello M, Di Paola M (2009). CFD approach for the induced effects of free wake past rivulets on cables of stayed bridges. COMPUTATIONAL FLUID DYNAMICS JOURNAL, vol. 18, p. 1-12, ISSN: 0918-6654</p> <p><b>Proveniente dal sistema gestione pubblicazioni: UNIPA con codice 10447/41684</b></p>
10	2009	<p>MARRETTA R, DARICELLO M, DI PAOLA M (2009). CFD approach for the induced effects of free wake past rivulets on cables of stayed bridges. COMPUTATIONAL FLUID DYNAMICS JOURNAL, vol. 18, p. 1-21, ISSN: 0918-6654</p>
11	2009	<p>MARRETTA R (2009). Digital control circuitry for the p53 dynamics in cancer cell and apoptosis. CENTRAL EUROPEAN JOURNAL OF BIOLOGY, vol. 4, p. 1-15, ISSN: 1895-104X</p>
12	2009	<p>MARRETTA R, BARBARACI G (2009). Digital control circuitry of cancer cell and its apoptosis. MOLECULAR &amp; CELLULAR BIOMECHANICS, vol. 6 (3), p. 175-189, ISSN: 1556-5297</p>

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| 13 | 2009 | <p>Marretta R, Barbaraci G (2009). Digital control circuitry of cancer cell and its apoptosis. MOLECULAR &amp; CELLULAR BIOMECHANICS, vol. 6, p. 175-189, ISSN: 1556-5297</p> <p><b><i>Proveniente dal sistema gestione pubblicazioni: UNIPA con codice 10447/41686</i></b></p>  |
| 14 | 2008 | <p>Marretta R, Marino F, Bianchi P (2008). Computer active control of damping fluid of a racing superbike suspension scheme for road safety improvement spin-off. INTERNATIONAL JOURNAL OF VEHICLE DESIGN, vol. 46, p. 436-455, ISSN: 0143-3369, doi: 10.1504/IJVD.2008.020308</p> <p><b><i>Proveniente dal sistema gestione pubblicazioni: UNIPA con codice 10447/41681</i></b></p> |
| 15 | 2008 | <p>MARRETTA R, MARINO F, BIANCHI P (2008). Computer active control of damping fluid of a racing superbike suspension scheme for road safety improvement spin-off. INTERNATIONAL JOURNAL OF VEHICLE DESIGN, p. 436-455, ISSN: 0143-3369</p>   |
| 16 | 2007 | <p>MARRETTA R, MARINO F (2007). WING FLUTTER SUPPRESSION ENHANCEMENT USING A WELL-SUITED ACTIVE CONTROL MODEL. PROCEEDINGS OF THE INSTITUTION OF MECHANICAL ENGINEERS. PART G, JOURNAL OF AEROSPACE ENGINEERING, vol. 221, p. 1-12, ISSN: 0954-4100</p>  |

17	2007	MARRETTA R, MARINO F (2007). WING FLUTTER SUPPRESSION ENHANCEMENT USING A WELL- SUITED ACTIVE CONTROL MODEL. PROCEEDINGS OF THE INSTITUTION OF MECHANICAL ENGINEERS. PART G, JOURNAL OF AEROSPACE ENGINEERING, vol. 221, p. 1-12, ISSN: 0954-4100
		<b><i>Proveniente dal sistema gestione pubblicazioni: UNIPA con codice 10447/19885</i></b>
18	2006	MARRETTA R (2006). Bem pre-processor for CFD post-processing in propeller hydroacoustic emission computation. COMPUTATIONAL FLUID DYNAMICS JOURNAL, vol. 15(3), p. 338-353, ISSN: 0918-6654
19	2003	MARRETTA R, TASSONE G. (2003). A vorticity based aeroacoustic prediction for the noise emission of a low-speed turbulent internal flow. COMPUTERS & FLUIDS, vol. 32, p. 457-478, ISSN: 0045-7930
20	2002	MARRETTA R, LOMBARDI G, ANTINORO R. (2002). Performance Computations and Design Criterion of Airfoils in Unsteady Viscous Flows. COMPUTER MODELING IN ENGINEERING & SCIENCES, vol. 1, N. 4, p. 73-83, ISSN: 1526-1492
21	2001	MARRETTA R, CARLEY M., DAVI' G., LOMBARDI G., MILAZZO A. (2001). A Procedure for the Evaluation of Installed Propeller Noise. JOURNAL OF SOUND AND VIBRATION, vol. 244(4), p. 697-716, ISSN: 0022-460X

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| 22 | 2000 | MARRETTA R,<br>SIMONETTI F. (2000).<br>A Numerical Variational<br>Approach for Rotor-<br>Propeller Aerodynamics<br>in Axial Flight.<br>COMPUTER<br>MODELING IN<br>ENGINEERING &<br>SCIENCES, vol. 1, N. 3,<br>p. 81-90, ISSN:<br>1526-1492               |
| 23 | 2000 | MARRETTA R,<br>CARLEY M., DAVI' G.,<br>LOMBARDI G.,<br>MILAZZO A. (2000).<br>Simulation Model and<br>Computation of Noise<br>Emission of an Installed<br>Propeller. JOURNAL OF<br>FLUIDS<br>ENGINEERING, vol. 4,<br>N. 2, p. 104-116, ISSN:<br>0098-2202 |
| 24 | 1999 | MARRETTA R, DAVI'<br>G., LOMBARDI G.,<br>MILAZZO A. (1999).<br>Hybrid numerical<br>technique for evaluating<br>the aerodynamic loads<br>with propeller<br>interference.<br>COMPUTERS &<br>FLUIDS, vol. VOL. 28,<br>p. 923-950, ISSN:<br>0045-7930        |
| 25 | 1999 | MARRETTA R, DAVI'<br>G., LOMBARDI G.,<br>MILAZZO A. (1999).<br>Wing pitching and<br>loading with propeller<br>interference. JOURNAL<br>OF AIRCRAFT, vol. 36,<br>N. 2, p. 468-471, ISSN:<br>0021-8669   |
| 26 | 1997 | MARRETTA R (1997).<br>Different wings<br>flowfields interaction on<br>the wing-propeller<br>coupling. JOURNAL OF<br>AIRCRAFT, vol. VOL.<br>35, N. 6, p. 747-757,<br>ISSN: 0021-8669  |
| 27 | 1997 | DAVI'G., MARRETTA R,<br>MILAZZO A. (1997).<br>Explicit Kutta condition<br>for Unsteady two-<br>dimensional high order<br>potential BEM. AIAA<br>JOURNAL, vol. VOL.<br>35, N. 6, p. 468-471,<br>ISSN: 0001-1452   |

28	1997	MARRETTA R, DAVI' G., LOMBARDI G., MILAZZO A. (1997). Wing propeller coupling simulation from tractor up to hover flight conditions. COMPUTERS & FLUIDS, vol. 2, N. 3, p. 304-321, ISSN: 0045-7930	
29	1996	MARRETTA R (1996). Performance of a propeller embedded in the flowfield of a wing. JOURNAL OF AIRCRAFT, vol. VOL. 33, N. 5, p. 919-923, ISSN: 0021-8669	
30	1994	MARRETTA R, LOMBARDO G. (1994). Coefficienti di trazione, di coppia e rendimento dell'elica in presenza del campo aerodinamico di un'ala finita. AEROTECNICA, MISSILI E SPAZIO, vol. VOL. 73, N.1-2, p. 31-41, ISSN: 0365-7442	
31	1994	MARRETTA R, DI TOMMASO S. (1994). Valutazione mediante modello fluidodinamico della lunghezza del getto prodotto da irroratrici pneumatiche a diffusore tubolare. RIVISTA DI INGEGNERIA AGRARIA, vol. VOL. 25, N.1, p. 42-49, ISSN: 0304-0593	
1	2010		Ardito, Marretta R, Ales F (2010). On Cancer Cell Cycle and Universal Apoptosis Parameters Signaling Unravalled In Silico. In: On Cancer Cell Cycle and Universal Apoptosis Parameters Signaling Unravalled In Silico. p. 7-20, Oak Park USA:Bentham Science Publishers Ltd
1	2009	MARRETTA R, ORLANDO C, CARLEY M (2009). BIE-based aeroacoustic design procedure. In: Proceedings International Conference on Computational & Experimental Engineering & Sciences - 2009. Phuket - Thailand, 8-13 aprile 2009, p. 12-18, NEWPORT BEACH:ICCES	



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| 6  | 2005 | MARRETTA R, F.<br>MARINO (2005). Active controller for wing flutter suppression enhancement. In: ATTI XVIII Congresso AIDAA. Volterra (PI), 19-22 settembre 2005, vol. 1, p. 1-12, PISA:Associazione Italiana Aeronautica Astronautica |
| 7  | 2001 | MARRETTA R,<br>TASSONE G. (2001). Aeroacoustic post-processor for computing the noise emission of a turbulent internal flow. In: INTERNATIONAL CONFERENCE ON COMPUTATIONAL ENGINEERING AND SCIENCES, ICES'01. 23-28 AGOSTO 2001        |
| 8  | 1997 | MARRETTA R, DAVI' G., LOMBARDI G., MILAZZO A. (1997). Coupling wing-propeller: aerodynamic interaction from tractor to hovering configuration. In: 4TH UNITED STATES NATIONAL CONGRESS ON COMPUTATIONAL MECHANICS. AGOSTO 1997         |
| 9  | 1997 | DAVI' G., MARRETTA R, MILAZZO A. (1997). Panel flutter by a symmetric and positive definite BEM formulation. In: INTERNATIONAL FORUM ON AEROELASTICITY AND STRUCTURAL DYNAMICS. 18-20/06/1997, vol. III, p. 151-158                    |
| 10 | 1995 | DAVI' G., MARRETTA R, MILAZZO A. (1995). BEM for the trailing edge and Kutta condition. In: INTERNATIONAL CONGRESS OF COBEM-CIDIM, BELO HORIZONTE. 12-15/12/1995.  |
| 11 | 1995 | DAVI' G., MARRETTA R, MILAZZO A. (1995). BEM formulation of the trailing edge condition. In: INTERNATIONAL CONGRESS OF BOUNDARY ELEMENT METHOD (IABEM). 30/07-04/08/1995   |

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| 12 | 1995 | DAVI' G., MARRETTA R, MILAZZO A. (1995).<br>Una formulazione del metodo degli elementi al contorno in campi di moto potenziali. In: 13° CONGRESSO DELL' ASSOCIAZIONE ITALIANA DI AERONAUTICA E ASTRONAUTICA (AIDAA),. 11-15/09/1995.                              |
| 13 | 1992 | MARRETTA R, DI TOMMASO S. (1992).<br>Environment protection: a fluid dynamic model for soil interaction with fast jets to be used for spraying. In: INTERNATIONAL SYMPOSIUM ON HEAT AND MASS TRANSFER. 22-25/08/1992  |
| 14 | 1992 | MARRETTA R, DI TOMMASO S., PIGNATO L. (1992).<br>Protection of environment: proposal of a newly conceived high potential machine for the spraying of antiparasitic and plant protection products on crops. In: 9TH WORLD CLEAN AIR CONGRESS. 30/08-03/09/1992     |
| 15 | 1991 | MARRETTA R, DI TOMMASO S., PIGNATO L. (1991).<br>Prevention of environment contamination with antiparasitic substances sprayed by fixed facilities. Fluid dynamic model. In: KOREA AIR POLLUTION RESEARCH ASSOCIATION, IUAPPA, REGIONAL CONFERENCE. 04-06/09/1991 |
| 16 | 1990 | MARRETTA R, DI TOMMASO S. (1990).<br>MODELLO FLUIDODINAMICO PER DETERMINARE LE CONDIZIONI OTTIME DI PROGETTO E FUNZIONAMENTO DI ATTREZZATURE FISSE PER TRATTAMENTI ANTIPARASSITARI. In: 45° Congresso ATI, S. Margherita di Pula (CA),... 18-21/09/1990           |

1	2007	MARRETTA R, M. CARLEY, G. DAV, D. LO BOSCO, A. MILAZZO, G TESORIERE (2007). Una formulazione agli elementi di contorno per l'analisi unificata aeroacustica ed aerodinamica di un treno ad alta velocità. vol. 10, p. 1-19, ROMA:Reti Ferroviarie Italiane
2	2005	MARRETTA R (2005). Studio ed applicazione di un sistema di sospensioni (ant. e post.) a controllo attivo e/ o semi-attivo per il motociclo MV Agusta F4. REPORT INTERNO. PALERMO: DIPARTIMENTO DI INGEGNERIA AERONAUTICA E DEI TRASP (ITALY). p. 1-75
3	2004	MARRETTA R (2004). Analisi, predizione ed ottimizzazione dei parametri aerodinamici di un motociclo ad alte prestazioni MV Agusta. p. 1-87, PALERMO:Dipartimento di Ingegneria Idrraulica ed Ambientale
4	2004	MARRETTA R (2004). Analisi, predizione ed ottimizzazione dei parametri termo- fluidodinamici interni di un motociclo ad alte prestazioni MV Agusta. p. 1-104, PALERMO:Dipartimento di Ingegneria Idrraulica ed Ambientale
5	2001	MARRETTA R, CARLEY M., DAVI' G., LOMBARDI G., MILAZZO A. (2001). A Procedure for the Evaluation of Installed Propeller Noise. p. 1-27, PALERMO:DIPARTIMEN DI MECCANICA ED AERONAUTICA
6	1996	DAVI' G., MARRETTA R, MILAZZO A. (1996). Kutta condition for 3D flows by BEM. p. 1-28, PALERMO:DIPARTIMEN DI MECCANICA ED AERONAUTICA

7	1993	MARRETTA R, DI TOMMASO S. (1993). Protezione dell'ambiente: Modello fluidodinamico di interazione con il suolo di getti veloci da utilizzare per l'irrorazione agricola con prodotti antiparassitari. p. 1-12, PALERMO:DIPARTIMEN DI MECCANICA ED AERONAUTICA
8	1993	MARRETTA R, BUSCAGLIA L. (1993). Visualizzazione della distribuzione delle velocità in galleria idrodinamica con il metodo della colorazione dei filetti fluidi. p. 1-25, PALERMO:DIPARTIMEN DI MECCANICA ED AERONAUTICA

## ATTIVITA' SCIENTIFICHE

In the last five years, the scientific activity of the writer focused on CFD approach of unsteady thermal-fluid dynamic fields, digitally-based devices for aircraft and vehicles control systems, low-noise design of marine and aircraft propeller and, more recently, the digital design of human cell cycle sequencer for anti-cancer applications. More in detail, the results of that early activity regard the enhancement of numerical and analytical models and formulations for solving complex problems arising from aerodynamic/aeroacoustic interactions and interference among lifting surfaces and propeller elements. The topics of the current research activities can be resumed in the following:

- CFD approach and modeling of 3D thermal/fluid dynamic fields;
- Active control of *wing-flutter*;
- Simulation and investigation of aerodynamic interference;
- Active and digital aircraft control systems;
- Low-noise propeller design;
- *In silico* simulation of cancer cell cycle

## 1.1 Description of scientific activity

In the following sections, the scientific activities are exploited at their utmost.

### 1.1.13D Modelling of thermal-flow fields

In cooperation with ENEA (Italian Institute for Atomic Energy), a FEM/FVM (*Finite Element Method/Finite Volume Method*)-based model has been built up for the analysis and evaluation of a viscous, turbulent, thermal flow. The involved numerical procedure allows to investigate peculiar aspects of this high-temperature flows and determine the design concepts for innovative combustors having considerable energy saving.

**Publication: Marretta-Calchetti-Rufoloni-Mannino: "Study of Hydrogen-Air Non-premixed Combustion", 29<sup>o</sup> International Combustion Congress, Pisa, 14-17/06/2006.**

### **1.1.2 Digital design of active control devices to avoid wing-flutter**

Scientific attention has been paid to digital devices for actively controlling the *wing flutter* arising and its dynamical suppression in terms of safety flight.

Methodology was based on two closed feedback circuitries in closed scheme for achieving stability of aeroelastic systems of a combat or civil aircraft when airspeed of flight overcome those of flutter in open circuit.

**Publications:** Marretta-Marino: “Active Controller for Wing Flutter Suppression Enhancement”, *XVIII Congresso AIDAA*, Volterra (PI), 19-22 settembre 2005.

Marretta-Marino: “Wing Flutter Suppression Enhancement Using a Well-Suited Active Control Model”, *Journal of Aerospace Engineering*, Vol. 221, pp. 441-452, 2007.

### **1.1.3 Marine and aeronautical propellers – flow fields and aeroacoustic design**

Free-wake analysis, CFD and Boundary Element approaches were employed for applications regarding the investigation of propeller performances with low noise emission and for cavitation control. A devoted computational routine (patented by the writer), *FOB*<sup>®</sup>, was built up to match the propeller optimal airfoil in terms of thrust and noise emission and/or incoming cavitation.

In shakedown phase, the computational scheme is capable to process and detect the optimal airfoil among all the possible NACA database (4, 5, 6, 7 digits and modified) having a cluster of 600.000 airfoil sections families.

**Publication:** Marretta: “BEM Pre-processor for CFD Post-processing in Propeller Hydroacoustic Emission Computation”, *Computational Fluid Dynamics Journal*, Vol. 15, n. 3, pp. 338-353, 2006.

### **1.1.4 Digital wirings platforms for mechanical and aeronautical systems control**

In cooperation with Centro Ricerche Cagiva and MV Agusta S.p.A. (world leader manufacturer of race superbike), CFD approach and control systems theory have been applied for the new aerodynamic outfit of the superbike model MV Agusta F4 and of an innovative digital-based control scheme of suspensions frames. Design novelties give a spin-off of increased maximum speed, aerodynamic efficiency increasing and all-at-once wheels active control.

**Publications:** Marretta, Marino, Bianchi: “Computer Active Control of Damping Fluid of a Racing Superbike Suspension Scheme for Road-Safety Improvement Spin-off”, *International Journal of Vehicle Design*.

Marretta, Daricello, Di Paola: CFD Approach for the Induced Effects of Free Wake past Rivulets on Cables of Stayed

Bridges”, *CFD Journal*, 2010

Marretta, Bedson: “Risk Assessment of FQI Replacement in ATR72 Aircraft”, submitted to *AIAA Journal of Aircraft*, 2009.

### **1.1.5 Low-noise emission design of high-speed trains**

Applications and investigation through BEM have been made for designing high speed trains outfits having low noise pollution. Results were applied to a Italian Railways Service train (ETR 500) future design..

**Publications: Marretta, Orlando, Carley: “Boundary Element Formulation for Unified Analysis of High-Speed Trains”, International Conference on Boundary Element Techniques 24-26th July 2007, Naples, Italy.**

**Marretta, Carley, Davì, Lo Bosco, Milazzo, Tesoriere, “Una Formulazione agli Elementi di Contorno per l’Analisi Unificata Aeroacustica e Aerodinamica di un Treno ad Alta Velocità”, *Rivista RFI*, Anno 4, No. 10, pp. 121-135, dicembre 2006.**

### **1.1.6 Patents and aircraft accidents investigations**

- a) Human cell master digital simulator for the cancer cell cycle proteins evolutions.
- b) Digital feedback multi-nested platform for human cell cycle apoptosis re-entering.
- c) Digital schemes and automatic procedure for identifying and removing signal artifacts arising from deep brain stimulations.
- d) Investigator for the Italian Minister of Justice for a military aircraft mortal accident (1999).
- e) Investigator for the Italian Minister of Justice for a military aircraft mortal accident (2000).
- f) Chief Investigator for the Italian Minister of Justice for a civil aircraft mortal accident (2005).

## 1.2 Research teams coordinating

On behalf the role of Chief of Coordination:

- Year 2007. Research Convention and Grant between the Department of Aeronautical Infrastructures and – Naval Center Design Stabile: “Study and design of an innovative high performances hull.
- Years 2004-2006. Research Convention and Grant between the Department of Aeronautical Infrastructures (Italy) and Centro Ricerche Cagivaa and MV Agusta S.p.A. (Republic of S. Marino) regarding: “A study of the gas and thermal flows of the superbike MV Agusta F4 engine”.
- Years 2001-2006. Research convention between the Department of Aerospace Engineering of Pisa (Italy) and the Department of Aerospace Engineering of Palermo (Italy) for multi-tasking computational routines in designing optimal airfoil sections for low noise emission propeller; wing-blades aerodynamic interference and high performances veilings.

Years 1994-2001 Research convention among the Department of Aerospace Engineering of Pisa (Italy), the Department of Aerospace Engineering of Palermo (Italy) and the Department of Mechanical Engineering of Bath (UK) for the design of ultra-performance propeller for submariners silencers.

### AMBITI DI RICERCA

The topics of the current research activities can be resumed in the following:

- CFD approach and modeling of 3D thermal/fluid dynamic fields;
- Active control of *wing-flutter*;
- Simulation and investigation of aerodynamic interference;
- Active and digital aircraft control systems;
- Low-noise propeller design;
- *In silico* simulation of cancer cell cycle