14th World Congress on Computational Mechanics (WCCM XIV)
8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)
July 19- 24, 2020, Paris, France

TWISTED STRUCTURES IN WALL-BOUNDED FLOWS

POSSIBLE TRACKS: **600 - Fluid Dynamics and Transport Phenomena**
1500 - Fluid-structure Interaction, Contact and Interfaces

HORIA DUMITRESCU [*], ALEXANDRU DUMITRACHE [*]
AND VICTOR PRICOP [†]

[*] "Gheorghe Mihoc-Caius Iacob" Institute of Mathematical Statistics and Applied Mathematics of the Romanian Academy,
Calea 13 Septembrie 13, 050711 Bucharest, ROMANIA
E-mail address: horia.dumitrescu@yahoo.com, alex_dumitrache@yahoo.com
URL: www.ima.ro

[†] National Institute for Aerospace Research "Elie Carafoli" INCAS
220 Iuliu Maniu Avenue, 061126 Bucharest 6, P.O. 76, Romania
pricop.victor@incas.ro

Key words: Twisted structure, Wall-bounded flow, CFD, Navier-Stokes equations, Hydrodynamic coherent structure, Laminar-turbulent transition

ABSTRACT

The subject is concerned with the description of a fluid under conditions such that the well-established set of equations of hydrodynamics, the Navier-Stokes-Prandtl (N-SP) equations ceases to be valid. The ensuing problem usually referred to as higher order hydrodynamics or beyond the non-linear Navier-Stokes regime involving transition-turbulent processes, poses several challenges not all of which have been satisfactorily answered. This is not nearly a theoretical question. Situations of this kind occur in many contact phenomena in nature such as the absorption and dispersion of sound in fluids dynamics of swarms/agglomerations of particles, the structure of different profiles in shock waves at transonic Mach numbers, Couette flows, in continuum transition flows that appear around space vehicles, flows in microchannels and others.

Possible areas of interest include (but are not limited to): •

- Starting regime of wind turbine rotor;
- Aerodynamic and aerothermodynamic analysis of space mission vehicles;
- Active and passive flow control methods;
- Fluid-structure interaction analysis

REFERENCES

[1] H. Dumitrescu, V. Cardos, R. Bogateanu, A. Dumitrache, *Relativistic Contact-Wall Effects at Start-up*, INCAS BULLETIN, Vol. 11, Issue 2/ 2019, pp. 85 – 96.

[2] L. S. Garcia-Colin, R. M. Velasco, F. J. Uribe, *Beyond the Navier-Stokes equations: Burnett hydrodynamics*, Phys. Reports **465**, pp. 149-189, 2008.