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**On the lift induced drag in viscous flows** RENATO TOGNACCINI, Università di Napoli Federico II, CLAUDIO MARONGIU, CIRA (Italian Aerospace Research Center), MAKOTO UENO, JAXA (Japan Aerospace Exploration Agency)
— As stated by Spalart (*JFM*, 2008): "An ambition which will have to wait is a rigorous definition of induced drag in viscous flows." The idea that there is a link between the aerodynamic force and the Lamb vector, defined as the cross product of fluid vorticity and velocity dates back to Prandtl. Saffman ("Vortex Dynamics," 1992) and, more recently, Wu J.-Z. *et al.* (*JFM*, 2007) suggested an expression of the lift induced drag in terms of vortex force (the volume integral of the Lamb vector). In this paper we analyze the *steady* incompressible flow around a 3D lifting body at high Reynolds numbers. The suggested connection between vortex force and induced drag is discussed in detail. In particular, a rigorous definition of the lift induced drag in viscous flows without ambiguities is proposed. A numerical experiment: the analysis of the flow around an elliptic wing will confirm the theoretical analysis. The aerodynamic force and its lift and drag components are computed by integration of the Lamb vector field as obtained by a numerical solution and will be compared with classical expressions.

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