

## Electromagnetic modeling of antennas installed on aircraft

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The determination of the radiation properties of antennas mounted on an aircraft surface is not a straightforward issue. One of the classical ways of measuring radiation patterns is by means of in-flight tests, which are in general very expensive and demand an accurate positioning system. Moreover, high synchronization between the flying equipment and the ground station must be ensured. Another common method is the use of downscaled mock-ups. In order to keep the electrical dimensions of the mock-up the same as for the real aircraft, the measurement frequency must be scaled up. As the main drawback, this procedure demands a scaled version of the antenna, whose electromagnetic properties only approximate the full-sized real antenna. Due to the evolution on computing power and the development of efficient numerical methods in Electromagnetic, an alternative approach to determine installed performance of antennas is to use electromagnetic simulation. The generation of an accurate computer model of the aircraft and of the antenna allows determining properties that are very difficult to measure, such as the surface current densities that are excited on the airplane surface. This paper will describe different analyses carried out to assess the radiation characteristics of standard VHF and ATC antennas installed on civil airplanes. Furthermore, a study of the features of future navigation antenna arrays mounted on the fuselage of two different aircraft is presented. Theoretical and measured results performed with the use of scaled mock-ups are shown and discussed.

### Biography

Marcos V. T. Heckler received the B.Sc. degree in Electrical Engineering from Universidade Federal de Santa Maria, Santa Maria, Brazil, in 2001, the M.Sc. degree in Electronic Engineering from Instituto Tecnológico de Aeronáutica, São José dos Campos, Brazil, in 2003, and the Dr.-Ing. degree in Electrical Engineering from Technische Universität München, Munich, Germany, in 2010. From October 2003 to June 2010, he was a Research Associate with Institute of Communications and Navigation, German Aerospace Center. He is currently Professor with Universidade Federal do Pampa, Alegrete, Brazil. His current research interests are the design of micro strip antennas and arrays.

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