

Analytical Input Filter Design in DC Distributed Power Systems Approach taking Stability and Quality criteria into account

Sylvain Girinon ^{1,2}, Hubert Piquet ^{1,2}, Nicolas Roux ^{1,2}, Bruno Sareni ^{1,2}

¹ Université de Toulouse; INPT, UPS;
LAPLACE (Laboratoire Plasma et Conversion d'Energie);
ENSEEIH, 2 rue Charles Camichel, BP 7122, F-31071 Toulouse cedex 7, France.

² CNRS; LAPLACE; F-31071 Toulouse, France.

Tel.: +33 / (0) – 561.58.82.08 - Fax: +33 / (0) – 561.63.88.75

E-Mail: sylvain.girinon@laplace.univ-tlse.fr - URL: <http://www.laplace.univ-tlse.fr>

EPE 2009, September 2009

Abstract - This article presents an automated method for the sizing of filter parameters taking into account stability and quality criteria. The analytical linearized model of the system is automatically built from a circuit description. System stability conditions are firstly assessed on this model with the Routh-Hurwitz criterion. Then, filtering and damping conditions are introduced. To complete the sizing, optimization algorithms are introduced in order to minimize the energy stored in inductive and capacitive components. Simulations are performed on an embedded HVDC (High Voltage Direct Current) network onboard an aircraft (HVDC network); it associates several loads with their input filters, to validate the results obtained with the proposed method.