SIMULATION TECHNOLOGIES USED IN HIGH-SPEED PRINTED CIRCUIT BOARD DESIGN

Sorin BURDUCEA[1], Miron ZAPCIU[2]

Rezumat. *Proiectarea circuitelor imprimate şi a chip-urilor moderne implică lucrul cu fronturi de undă extrem de rapide, care generează o gamă largă de armonici superioare. Acestea schimbă distribuţia curenţilor electrici, generând interferenţe electromagnetice, cuplarea între liniile adiacente, dezechilibrul sistemului de alimentare, reflexii, rezonanţe şi efecte termice nedorite. Utilizarea instrumentelor de simulare şi gestionare a constrângerilor sistemului electronic este absolut necesară, iar progresul tehnologic din ultima perioadă a adus cu sine o gamă de algoritmi capabili să anticipeze în proporţie semnificativă funcţionarea dispozitivelor electronice.*

Abstract. *Fast transients of today's chips generate a large amount of high frequencies harmonics which in turn bring upon the designer an increasing amount of problems. Heat, crosstalk, electro-magnetic interference, ground bounce, reflections, plane resonance and many other issues turn the design decision making into an extremely complex problem. The use of tools for simulating and managing the constraints of the electronic system is absolutely necessary, and recent technological progress has brought with it a range of algorithms capable of significantly anticipating the operation process of electronic devices.*

1. Introduction

The scope of this paper is to set the grounds for a hardware solution on which the open ODrive servo motor control firmware can be implemented. The emphasis is on PCB design. This work presents the placement of the components on the PCB, based on their thermal footprint and electronic schematic. For simulation purposes, Ansys IcePak will be used.

Electronic layout of servomotor

The electronic schematic is being developed first. The design draws on component manufacturer application notes and on ODrive's 3.5 schematic. There are however significant differences from ODrive schematic regarding the brake chopper schematic, power distribution, absence of CAN bus and IO header layout. In order to organize the electronic components, they were grouped together

---

[1] Eng. PhD student, Siemens Romania SRL, University POLITEHNICA of Bucharest, Spl. Independentei 313, ZipCode 060042, Bucharest, E-mail: sorin.burducea@siemens.com;
[2] Professor, University POLITEHNICA of Bucharest, Academy of Romanian Scientists, 3 Ilfov str., Bucharest, Romania, E-mail: miron.zapciu@upb.ro