One Year Engineer Position – INRIA Rhône–Alpes

Numerical Simulation of Nonsmooth Electrical Circuits in the SICONOS platform

April 20, 2007

Position : INRIA Expert Engineer.

- Before September 2007.

- Gross Salary (before tax) between 2400 euros and 2800 euros following the professional and the educational background.

Context Within the BipOp team[1], the engineer will work on the project VAL-AMS (a common french ANR project with the VERIMAG laboratory) concerning the simulation and the validation of hybrid electrical circuits[2].

Position Description The numerical simulation of electrical circuits is of utmost importance for the design and the validation of electrical circuits. In this context, the need for an efficient hybrid (analog/digital) simulator is unavoidable. The approach proposed by the BipOp project is to recast a certain class of hybrid systems into the framework of the non smooth dynamical systems. This framework provides us with some definitions of global solutions together with reliable and efficient simulation tools, robust with respect to modes changes and events. This approach, which has been already successfully implemented for the nonsmooth mechanical systems has been implemented in the scientific software platform SICONOS[3] for small electrical circuits.

The objective of this job is to formalize the treatment of large electrical circuits from theirs descriptions in terms of SPICE-type netlists. More precisely, the job consists in:

- analyzing the basic methods to formulate circuit equations (Sparse Tableau Analysis, Modified Nodal Analysis),

- understanding the difficulties and the specificities of the non smooth formulation of circuits,

- proposing a method and implementing a software module in C++ for the automatic formulation of circuits inside SICONOS,

- validating the approach by a set of industrial tests.

Required skills and educational background

- Master or Ph. D thesis in Applied Mathematics/Numerical Analysis.

  - Scientific computing: Linear Algebra and Ordinary Differential Equations
  - Notion in Graph Theory.

- C++ programming

How to applicate ? A curriculum vitæ and a cover letter have to be sent in preference by e-mail to

- Vincent Acary (`Vincent.Acary@inrialpes.fr`)
  Projet BipOp, INRIA Rhône–Alpes, Innovallée, 655 avenue de l'Europe,
  Montbonnot 38334 Saint Ismier Cedex, FRANCE

and with a copy to

- Marie-Anne Dauphin, (`Marie-Anne.Dauphin@inrialpes.fr`)
  Service des Ressources Humaines, INRIA Rhône–Alpes, Innovallée, 655 avenue de l'Europe,
  Montbonnot 38334 Saint Ismier Cedex, FRANCE

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[1] http://bipop.inrialpes.fr
[2] http://www-verimag.imag.fr/~tdang/VAL-AMS/People.html
[3] http://siconos.gforge.inria.fr