Title: To a compact modeling of first order and noise electrical phenomena for 3D integration technology

Subject:
3D Si integration seems a right way to go and compete with Moore's law (more than Moore versus more Moore).
However, it is still a long way to go.
In 2010, the question was: Why 3D? Today, the questions are: When 3D? and How 3D.
Actual forecasts are from 10 to 15 millions of 3D wafers to be shipped by 2015. The 3D TSV (Trough Silicon via) applications range is wider and pure memories applications are no more the main ones.
The interconnections between the different layers are made with TSVs and introduce new challenges in terms of electrical performances, interferences, thermal dissipation.
This PhD proposal aims at developing theory and modelling essentially in a noise point of view. The work will focus on the electrical behavior of the TSVs with a particular emphasis on the possible interactions between in-depth noise sources, for instance: thermal ones, supply bounces, digital.
- The physical model, based particularly on the Impedance Field Method and thermo-electromagnetic 3-D simulations, will be used to analyze the impact on the RF performances of specific blocks of the whole integrated system, the scalable compact/analytical model is used for SPICE simulation at sub-system level.

Keywords:
through silicon via (TSV), 3D integration, noise sources: thermal, supply bounces, digital noise, electromagnetism, numerical and analytical simulation, device and circuit modeling

Expected collaborations:
this PhD proposal is linked to the international project INFIERI (INTELLIGENT FAST INTERCONNECTED AND EFFICIENT DEVICES FOR FRONTIER EXPLOITATION IN RESEARCH AND INDUSTRY) PROGRAM.

Background required from the applicant:
through silicon via (TSV), 3D integration, noise sources: thermal, supply bounces, digital noise, electromagnetism, numerical and analytical simulation, device and circuit modeling

Existence of a PDF file detailing the proposal ("yes" or "no") : YES
(see guidelines on the website www-csc.utt.fr)