



C E R N A

CENTRE D'ÉCONOMIE INDUSTRIELLE



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Internship proposal

Subject : Numerical Methods for solving parabolic PDE arising in
quantitative finance in dimension larger than 2

Advisors: Alain Galli (ENSMP) and L. Halpern (Univ. Paris 13)

Location Ecole des Mines de Paris

60, Boulevard Saint Michel, Paris

Project topic

Under the complete market hypothesis most derivatives used in finance like European options on equity or fixed income can be evaluated in two different ways, either by computing a conditional expectation or solving a parabolic PDE. The latter method is known to be faster than the first in spaces of dimension up to two. However more and more complex products have to be evaluated leading to higher dimensional spaces.

Here we wish to investigate two types of methods which are less sensitive to the curse of dimensionality:

1. Hybrid methods coupling Monte Carlo Simulations & PDE numerical methods
2. Using adaptive spatial tensor product wavelet to represent the solution.

The work will start with a thorough literature search on the two methods, then applications to test problems coming to finance will be developed, in order to determine the performance of the methods in practice.

Conditions

Location: The intern will be based at the Ecole des Mines, 60 Bd Saint-Michel in central Paris.

Duration: 3 to 4 months

The intern will receive

- An economy class electronic return ticket Ho-Chi-Minh Ville-Paris will be sent to the intern,
- A monthly stipend of 750 euros.

Some help will be provided in finding accommodation.