Société de Calcul Mathématique, S. A.
*Algorithmes et Optimisation*

# A prize offered by SCM

September 1st, 2009

The document "Robust Mathematical Methods for Extremely Rare Events"
http://www.scmsa.com/BB_rare_events_2009_08.pdf
dated August 2009, by Bernard Beauzamy, uses the computation of a multiple integral, over a complicated domain in a many-dimensional space, in order to estimate a probability. This approach is inherent to the method itself.

However, the computation of the integral is done in a way which might not be the best : the function to integrate is a polynomial in one variable (with degree >100 in our case), with rational coefficients (all coefficients are of the form $m/n$, where $m$ and $n$ are very large integers). In the paper, all coefficients are computed exactly, using the symbolic capabilities of Maple.

Therefore, the integration is slow and requires considerable memory in the computer. Typically, at this point, our method requires 30 multiple integrations, each of which takes around 20 minutes on an ordinary computer.

We would be interested to know if other numerical approaches are possible in order to compute such multiple integrals, with sufficient accuracy.

We offer a prize of Euros 1,000 to the best solution : solution that can handle the requirements of speed, accuracy, and adaptability (not just our example, but any such example). Solutions may be provided by individuals or by teams.

The solutions should be sent by email to :

scm.sa@orange.fr

no later than March 31st, 2010.

The best solution, besides the prize, will be posted on the "Robust Mathematical Modeling" web site and will be communicated to all participants to the RMM program, worldwide (see http://www.scmsa.com/robust.htm).