

# Mathematical Colloquium CIDMA / DMat

December 16, 2020, at 17h

Link ZOOM:

<https://videoconf-colibri.zoom.us/j/87348702486?pwd=Y3RlSTlMZk8wNnZlblRmdGtpWnpUUT09>

## New HPC Paradigm for Object Oriented Languages

Dmitri Goloubentsev

MatLogica library introduces a new practical programming paradigm for parallel computing with optional Automatic Adjoint Differentiation that brings leaps in performance for repetitive calculations. Examples of such problems include Monte-Carlo simulations, historical analysis, computation of sensitivities, FD grid pricing models, model calibrations and curve fitting.

This library uses simple to integrate Operator Overloading technique that keeps required code changes to minimum achieving fast integration and keeping code maintainable. Performance improvements are achieved by on-the-fly compilation of user valuations into CPU binary instructions. It works by executing a user program for one instance of data to extract the performed mathematical expressions. It then builds highly optimized versions of forward (replicating user valuations) and adjoint(AAD) kernels to process multiple samples in parallel. We demonstrate how MatLogica library works, in simple terms, and provide an idea of integration complexity using our recent use cases of large open source-projects QuantLib and ORE.

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**About the speaker:** Dmitri Goloubentsev has 15 years of combined experience in model development working on C++ quant libraries. He worked as a Senior Quant Analyst in interest rate derivatives and played a leading role in delivering XVA solution at a major Canadian bank. Prior to focusing on AAD, he was responsible for construction of SIMM/MVA model. Dmitri earned his degree in Mathematics and Applied Mathematics from the Moscow State University.