Contribution ID: **7**   Type: **Parallel talk**

HYPERDIRE: HYPERgeometric DIfferential REduction HYPERDIRE: HYPERgeometric DIfferential REduction Mathematica based programs for differential reduction of hypergeometric functions and its application to Feynman Diagrams Calculation.

Tuesday, 6 September 2011 14:00 (25 minutes)

The differential reduction algorithm allows to change the values
of parameters of any Horn-type hypergeometric functions on arbitrary
integers numbers. The description of mathematical part of algorithm
have been presented on ACAT08 by M.Kalmykov [6].
We will describe the status of project and will present a new version
of MATHEMATICA based package including a several important hypergeometric
functions of one and two variables.

Interrelation between Differential Reduction algorithm
and Integration-by-Parts technique is discussed.
We illustrate the procedure in the context of
generalized hypergeometric functions, and give an
example for a type of bubble and propagator type diagram.
Another application of HYPERDIRE is the construction of
epsilon-expansion of Horn-type Hypergeometric Functions.

Talk is based on the following publications:

1. "HYPERDIRE: HYPERgeometric functions DIfferential REduction MATHEMATICA
   based packages for differential reduction of generalized hypergeometric
   functions: now with pFq, F1,F2,F3,F4"
   by V.V.Bytev, M.Yu.Kalmykov,B.A.Kniehl,
   [arXiv:1105.3565]

2. "Differential Reduction Techniques for the Evaluation of Feynman Diagrams"
   by S.A. Yost, V.V. Bytev, M.Yu. Kalmykov, B.A. Kniehl, B.F.L. Ward
   PoS ICHEP2010:135,2010
   [arXiv:1101.2348]

3.
"Differential reduction of generalized hypergeometric functions from
Feynman diagrams: One-variable case",
by V.V.Bytev, M.Yu.Kalmykov,B.A.Kniehl,
Nucl.Phys.B836:129-170, 2010 [arXiv:0904.0214]

4.
"Counting master integrals: integration by parts vs. differential reduction"
by Mikhail Yu. Kalmykov, Bernd A. Kniehl
[arXiv:1105.5319]

5.
"Differential Reduction Algorithms for Hypergeometric Functions
Applied to Feynman Diagram Calculation"
by V.V.Bytev, M.Kalmykov, B.A.Kniehl, B.F.L.Ward, S.A.Yost
[arXiv:0902.1352]

[6]
"Feynman Diagrams, Differential Reduction, and Hypergeometric Functions"
by M. Yu. Kalmykov, V. V. Bytev, Bernd A. Kniehl, B.F.L. Ward, S.A.Yost
PoS ACAT08:125,2009 [arXiv:0901.4716]

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