- #1 in a slightly modified form [A.V. Smirnov & V.A. Smirnov'08]
  Let

$$\prod_i \Gamma\left(a_i(\epsilon)+\sum_j b_{ij}(\epsilon) z_j\right)$$

be the numerator of a multiple MB integral. Let ϵ be real. 'Changing the nature' of the key gamma functions (i.e. changing rules for the contours)

$\Gamma\left(a_i(\epsilon)+\sum_j b_{ij}(\epsilon) z_j\right) \to \Gamma^{(1)}\left(a_i(\epsilon)+\sum_j b_{ij}(\epsilon) z_j\right) \to$
$\ldots \to \Gamma^{(n)}\left(a_i(\epsilon)+\sum_j b_{ij}(\epsilon) z_j\right) \ldots$

instead of $a_i(\epsilon)+\sum_j b_{ij}(\epsilon)\text{Re} z_j > 0$

we have $-1 < a_i(\epsilon)+\sum_j b_{ij}(\epsilon)\text{Re} z_j < 0, \ldots,$

$-n-1 < a_i(\epsilon)+\sum_j b_{ij}(\epsilon)\text{Re} z_j < -n, \ldots$

Strategy #2: straight contours in the beginning

Strategy #1: straight contours in the end

Set $\epsilon = 0$
Look for straight contours (i.e. Rez_i) for which gamma functions are changed in a minimal way.

`Nminimize`

Let $S(x) = [(1-x)_+]$ where $[\ldots]$ is the integer part of a number and $x_+ = x$ for $x > 0$ and 0 otherwise.

Look for contours for which $\sum_i S\left(a_i(0) + \sum_j b_{ij}(0) z_j\right)$ is minimal.

With such a choice, identify gamma functions which should be ‘changed’.

Take a residue and replace Γ by $\Gamma^{(1)}$ (and, possibly, $\Gamma^{(1)}$ by $\Gamma^{(2)}$ etc.) Proceed iteratively.

MBresolve.m

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