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Vanishing of Certain 1-form Attached to a Configuration

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This is a remark to my paper [1], "Configurations and invariant Gauss-Manin connections of integrals". In the sequel we use the terminologies in [1].

Consider the integral

$$\hat{\varphi}(\phi)=\int \hat{U}(\lambda)dx_1\wedge\cdots\wedge dx_n \tag{1}$$

for $\hat{U}(\lambda)=\hat{f}_0^{\lambda_0}\hat{f}_1^{\lambda_1}\cdots\hat{f}_m^{\lambda_m}$, $\lambda_0,\cdots,\lambda_m\in \boldsymbol{C}$ where $\hat{f}_0$ and $\hat{f}_j$ denote functions $1-x_1^2-\cdots-x_n^2$, $\sqrt{-1}\sum_1^n u_{j,\nu}x_\nu+u_{j,0}$ respectively. We put $a_{0,0}=1$, $a_{j,k}=\sum_0^n u_{j,\nu}u_{k,\nu}$ and $a_{j,0}=u_{j,0}$ for $1\leqq j,\ k\leqq m$. $u_{j,\nu}$ are normalized such that $a_{j,j}=1$ for all j. For the symmetric configuration matrix $A=((a_{j,k}))_{0\leqq j,k\leqq m}$ we denote by $A\begin{pmatrix} i_1, & \cdots, & i_p \\ j_1, & \cdots, & j_p\end{pmatrix}$ the subdeterminant of the $i_1,\cdots,i_p$ th lines and the $j_1,\cdots j_p$ th columns. A sequence of 1-forms $\theta\begin{pmatrix} & \phi & \\ i_1, & \cdots, & i_p\end{pmatrix}$ for $1\leqq p\leqq n+1$ are defined in an inductive way:

$$\theta\begin{pmatrix}\phi\\ i\end{pmatrix}=da_{0,i} \tag{2$_1$}$$

$$\theta\begin{pmatrix}\phi\\ j,\ k\end{pmatrix}=da_{j,k}+\frac{A\begin{pmatrix}0, & k\\ k, & j\end{pmatrix}}{A(0,\ k)}da_{0,k}+\frac{A\begin{pmatrix}0, & j\\ j, & k\end{pmatrix}}{A(0,\ j)}da_{0,j} \tag{2$_2$}$$

$$\theta\begin{pmatrix} & \phi & \\ i_1, & \cdots, & i_p\end{pmatrix}=\sum_1^p(-1)^\nu\theta\begin{pmatrix} & & \phi & & \\ i_1, & \cdots, & i_\nu, & \cdots, & i_p\end{pmatrix}\cdot\frac{A\begin{pmatrix}0, & i_1, & \cdots, & \hat{i}_\nu, & \cdots i_p\\ & i_1, & \cdots, & i_p & \end{pmatrix}}{A(0,\ i_1,\ \cdots,\ \hat{i}_\nu,\ \cdots i_p)}, \tag{2$_p$}$$

for $p\geqq 3$.

where $\cdots,\hat{i}_\nu\cdots$ denotes the deletion of the index i_ν. (There are misprints in (3, 9), (3, 10), (3, 11) and (3, 12), [1] which should be corrected as above.)

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