UNIQUE CONTINUATION FOR PARABOLIC EQUATIONS OF HIGHER ORDER

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1. Let $x=(x_1, \ldots, x_n)$ be a point in the n-dimensional Euclidean space and let $\mathscr{D}$ be the unit sphere $|x|=\left(\sum_{i=1}^{n} x_i^2\right)^{1/2}<1$. In the $(n+1)$-dimensional Euclidean space with coordinate (x, t), we put

$$\Omega=\Omega_{T', T''}=\{(x, t) \ ; \ x\in\mathscr{D}, \ T'\leqq t\leqq T''\}$$

and

$$S=S_{T', T''}=\{(x, t) \ ; \ x\in\dot{\mathscr{D}}, \ T'\leqq t\leqq T''\},$$

where $\dot{\mathscr{D}}$ denotes the boundary of $\mathscr{D}$. We also use the following notation:

$$\mathscr{D}_T=\{(x, t) \ ; \ x\in\mathscr{D}, \ t=T\}.$$

For real-valued functions $h_1=h_1(x, t)$ and $h_2=h_2(x, t)$ square integrable in Ω, we put

$$(h_1, h_2)=(h_1, h_2)_\Omega=\iint_\Omega h_1 h_2 \, dxdt$$

and

$$\|h_1\|^2=\|h_1\|_\Omega^2=\iint_\Omega h_1^2 \, dxdt.$$

We denote by $\mathfrak{V}$ the family of all the functions $v=v(x, t)\in C^{2s}(\Omega\cup S)$ which vanishes on $\mathscr{D}_{T'}$ and satisfies $D_x^\alpha v=0$ $(|\alpha|\leqq s-1)$ on S. Here $C^{2s}(\Omega\cup S)$ is the class of all functions $2s$-times continuously differentiable in (a neighbourhood of) $\Omega\cup S$ and $D_x^\alpha v$ is the derivative

$$\frac{\partial^{|\alpha|}v}{\partial x_1^{\alpha_1}\cdots\partial x_n^{\alpha_n}}$$

of v for a multi-index $\alpha=(\alpha_1, \ldots, \alpha_n)$ $(\alpha_i\geqq 0)$ of integers with length $|\alpha|=\alpha_1+\cdots+\alpha_n$.

2. Consider a differential operator

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