ÜMUMİLƏŞMİŞ SÜRÜŞMƏ İLƏ BAĞLI SİNQULYAR İNTEQRAL ÜÇÜN BİR BƏRABƏRLİK

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Tutaq ki, R^n- n ölçülü Evklid fəzası $(n \geq 1)$,

$$R^+_{m+3,3} = \{(x_1, ..., x_m, x_{m+1}, x_{m+2}, x_{m+3}) \in R_{m+3} : x_{m+1} > 0, x_{m+2} > 0, x_{m+3} > 0\}$$

$$T^s u(x) = c_\nu \int_0^\pi \int_0^\pi \int_0^\pi u(x' - s', \sqrt{x_{m+1}^2 - 2x_{m+1}s_{m+1}\cos\alpha_{m+1} + s_{m+1}^2},$$
$$\sqrt{x_{m+2}^2 - 2x_{m+2}s_{m+2}\cos\alpha_{m+2} + s_{m+2}^2}, \sqrt{x_{m+3}^2 - 2x_{m+3}s_{m+3}\cos\alpha_{m+3} + s_{m+3}^2})$$
$$\cdot \sin\alpha_{m+1}^{2\nu_{m+1}-1} \cdot \sin\alpha_{m+2}^{2\nu_{m+2}-1} \cdot \sin\alpha_{m+3}^{2\nu_{m+3}-1} \cdot d\alpha_{m+1} \cdot d\alpha_{m+2} \cdot d\alpha_{m+3}$$

isə Laplas-Bessel diferensial operatorunun doğurduğu ümumiləşmiş sürüşmə operatorudur, burada

$$x = (x', x_{m+1}, x_{m+2}, x_{m+3}), \quad s = (s', s_{m+1}, s_{m+2}, s_{m+3}), \; x', s' \in R^m$$

$\nu_{m+1} > 0, \nu_{m+2} > 0, \nu_{m+3} > 0$, c_ν -sabitdir.

Aşağıdakı sinqulyar inteqrala baxaq:

$$A\,u(x) = \text{v.p.} \int_{R^+_{m+3,3}} \frac{f(\theta)}{|s|^{m+s+2|\nu|}} [T^s u(x)] \cdot s_{m+1}^{2\nu_{m+1}} \cdot s_{m+2}^{2\nu_{m+2}} \cdot s_{m+3}^{2\nu_{m+3}} ds,$$

burada $\theta = \dfrac{s}{|s|}, |\nu| = \nu_{m+1} + \nu_{m+2} + \nu_{m+3}$.

Teorem: Tutaq ki , a,b ədədləri üçün $0 < a < b \leq +\infty$ şərti ödənir. Onda $\forall x \in R^+_{m+3,3}$ nöqtəsi üçün

$$\int_{\{s \in R^+_{m+3,3} : a < |s| < b\}} f\left(\frac{s}{|s|}\right) \cdot |s|^{-m-3-2|\nu|} \cdot [T^s u(x)] \cdot s_{m+1}^{2\nu_{m+1}} \cdot s_{m+2}^{2\nu_{m+2}} \cdot s_{m+3}^{2\nu_{m+3}} ds = \frac{1}{2} c_\nu$$
$$\times \int_{\{y \in R_{m+6} : a < |\tilde{x} - y| < b\}} f(\tilde{\theta}) \cdot |\tilde{x} - y|^{-m-3-2|\nu|} \cdot u\left(y', \sqrt{y_{m+1}^2 + \tilde{y}_{m+1}^2}, \sqrt{y_{m+2}^2 + \tilde{y}_{m+2}^2}, \sqrt{y_{m+3}^2 + \tilde{y}_{m+3}^2}\right)$$
$$\times |\tilde{y}_{m+1}|^{2\nu_{m+1}-1} \cdot |\tilde{y}_{m+2}|^{2\nu_{m+2}-1} \cdot |\tilde{y}_{m+3}|^{2\nu_{m+3}-1} dy$$

bərabərliyi ödənir, burada

$$\tilde{\theta} = \left(\frac{x' - y'}{|\tilde{x} - y|}, \frac{\sqrt{(x_{m+1} - y_{m+1})^2 + \tilde{y}_{m+1}^2}}{|\tilde{x} - y|}, \frac{\sqrt{(x_{m+2} - y_{m+2})^2 + \tilde{y}_{m+2}^2}}{}, \right.$$
$$\left. \frac{\sqrt{(x_{m+3} - y_{m+3})^2 + \tilde{y}_{m+3}^2}}{}\right),$$

$$\tilde{x} = (x', x_{m+1}, x_{m+2}, x_{m+3}, 0, 0, 0),$$

$$y=\left(y', y_{m+1}, y_{m+2}, y_{m+3}, \tilde{y}_{m+1}, \tilde{y}_{m+2}, \tilde{y}_{m+3}\right),$$

$$dy=d\, y_1 \cdot ... \cdot dy_{m+3} \cdot d\tilde{y}_{m+1} \cdot d\tilde{y}_{m+2} \cdot d\tilde{y}_{m+3}.$$

Ədəbiyyat

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