1. $\dfrac{\partial}{\partial x}\left(ax^n\dfrac{\partial w}{\partial x}\right)+\dfrac{\partial}{\partial y}\left(by^m\dfrac{\partial w}{\partial y}\right)=f(w).$

Heat/mass transfer equation for inhomogeneous anisotropic media with volume reaction.

Functional separable solution for $n\neq 2$ and $m\neq 2$:

$$w=w(r),\qquad r=\left[b(2-m)^2x^{2-n}+a(2-n)^2y^{2-m}\right]^{1/2}.$$

Here, the function $w(r)$ is determined by the ordinary differential equation $w''_{rr}+Ar^{-1}w'_r=Bf(w)$, where $A=\dfrac{4-nm}{(2-n)(2-m)}$, $B=\dfrac{4}{ab(2-n)^2(2-m)^2}$.

References

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