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On the functional equation of the homogeneous functions

The following functional equation is considered

$$f(x) = r^{\lambda} f(\omega) .$$

Here λ denotes a given number ($\lambda \neq -1, -2, \ldots$), x an arbitrary point of the n-dimensional Euclidean space, $r = |x|$, and $\frac{x}{r} = \omega$ is a point of the unit-sphere Ω of the considered space. It is proved that the most general solution of the considered functional equation in the domain of distributions has the following form:

$$r^{\lambda+n-1} \otimes \Phi$$

where Φ is an arbitrary distribution on Ω.

Also the case $\lambda = -1, -2, \ldots$ is treated.