Package 'nakagami'

October 28, 2026

Type Package

Title Functions for the Nakagami Distribution

Version 1.2.0

Description Density, distribution function, quantile function and random generation for the Nakagami distribution of Nakagami (1960) <doi:10.1016/B978-0-08-009306-2.50005-4>.

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Encoding UTF-8

Suggests testthat, knitr, rmarkdown

URL https://github.com/JonasMoss/nakagami

BugReports https://github.com/JonasMoss/nakagami/issues

Config/roxygen2/version 8.0.0

NeedsCompilation no

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Repository CRAN

Date/Publication 2026-10-28 20:10:02 UTC

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Nakagami *The Nakagami Density*

Description

Density, distribution function, quantile function and random generation for the Nakagami distribution with parameters `shape` and `scale`.

Usage

```
dnaka(x, shape, scale, log = FALSE)

pnaka(q, shape, scale, lower.tail = TRUE, log.p = FALSE)

qnaka(p, shape, scale, lower.tail = TRUE, log.p = FALSE)

rnaka(n, shape, scale)
```

Arguments

`x`, `q`	vector of quantiles.
`shape`	vector of positive, finite shape parameters.
`scale`	vector of positive, finite scale parameters.
`log`	logical; if `TRUE`, the density is returned on the log scale.
`lower.tail`	logical; if `TRUE` (default), probabilities are $P[X \leq x]$ otherwise, $P[X > x]$.
`log.p`	logical; if `TRUE`, probabilities are given on the log scale.
`p`	vector of probabilities.
`n`	non-negative integer number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

The Nakagami distribution (Nakagami, 1960) with shape m and scale Ω has density

$$2m^m/\Gamma(m)\Omega^m x^(2m-1)e^(-m/\Omega x^2)$$

for $x \geq 0$, $m > 0$ and $\Omega > 0$.

If Y is Gamma distributed with $shape = m$ and $rate = m/\Omega$ then $X = \sqrt{Y}$ is Nakagami distributed with $shape = m$ and $scale = \Omega$.

Sometimes, specifically in radio channels modeling, the parameter m is constrained to $m \geq 1/2$, but the density is defined for any $m > 0$ (Kolar et al., 2004).

Value

`dnaka` gives the density, `pnaka` gives the distribution function, `qnaka` gives the quantile function and `rnaka` generates random deviates.

The length of the result is determined by `n` for `rnaka`, and is the maximum of the lengths of the numerical arguments for the other functions.

The numerical arguments other than `n` are recycled to the length of the result. A zero-length numerical argument gives a zero-length result for `dnaka`, `pnaka` and `qnaka`.

References

Nakagami, N. 1960. "The M-Distribution, a General Formula of Intensity of Rapid Fading." In Statistical Methods in Radio Wave Propagation: Proceedings of a Symposium Held at the University of California, edited by William C. Hoffman, 3-36. Permagon Press.

Kolar, R., Jirik, R., & Jan, J. (2004). Estimator comparison of the Nakagami-m parameter and its application in echocardiography. Radioengineering, 13(1), 8-12.

See Also

The Gamma distribution is closely related to the Nakagami distribution.

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