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The D numbers and the central factorial numbers. (English) Zbl 1249.11032

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The so-called D-numbers of the first kind of order k are defined by the generating function

$$(t\csc t)^k=\sum_{n=0}^{\infty}(-1)^n D_{2n}^{(k)}\frac{t^{2n}}{(2n)!}.$$

The D-numbers of the second kind may be defined by

$$\frac{t}{\log(t+\sqrt{1+t^2})}=\sum_{n=0}^{\infty}d_{2n}t^{2n}.$$

The author connects these numbers and the central factorial coefficients. Latter numbers can be defined by polynomial identities. More precisely, the central factorial coefficients $t(n,k)$ of the first kind are the coefficients of the polynomial

$$x\left(x+\frac{n}{2}-1\right)\cdots\left(x+\frac{n}{2}-n+1\right),$$

while the central factorial coefficients $T(n,k)$ of the second kind are the linear combination coefficients of x^n with respect to the base

$$x\left(x+\frac{k}{2}-1\right)\cdots\left(x+\frac{k}{2}-k+1\right).$$

The author proves a number of identities with respect to these numbers. Some of them connect these numbers to the classical Bernoulli numbers.

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MSC:

11B68 Bernoulli and Euler numbers and polynomials
11B83 Special sequences and polynomials
05A19 Combinatorial identities, bijective combinatorics

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