An alternating permutation $w = a_1 \cdots a_n$ of $1, 2, \ldots, n$ is a permutation such that $a_i > a_{i+1}$ if and only if $i$ is odd. If $E_n$ (called an Euler number) denotes the number of alternating permutations of $1, 2, \ldots, n$, then $\sum_{n \geq 0} E_n \frac{x^n}{n!} = \sec x + \tan x$.

We will discuss such topics as other occurrences of Euler numbers in mathematics, umbral enumeration of classes of alternating permutations, longest alternating subsequences of permutations, and a connection with the cd-index of the symmetric group $\mathfrak{S}_n$. The cd-index is a noncommutative polynomial in the variables $c$ and $d$ that encodes the number of permutations $a_1 \cdots a_n \in \mathfrak{S}_n$ with specified values of $i$ for which $a_i > a_{i+1}$. (Received August 26, 2009)