Euler numbers are defined by
\[
\frac{1}{\cosh(x)} = \frac{2e^x}{e^{2x} + 1} = \sum_{n=0}^{\infty} E_n \frac{x^n}{n!}.
\]

We define a generalization of Euler numbers and polynomials by the generating functions

\[
G_N(x) := \frac{2e^x}{e^{2x} + T_{N-1}(x)} = \sum_{n=0}^{\infty} E_{N,n} \frac{x^n}{n!},
\]

and

\[
G_N(x, z) := \frac{2e^{x(z+1)}}{e^{2x} + T_{N-1}(x)} = \sum_{n=0}^{\infty} E_{N,n}(z) \frac{x^n}{n!}
\]

where

\[
T_m(x) = \sum_{k=0}^{m} \frac{x^k}{k!}.
\]

We refer these numbers and polynomials as \textit{hyperbolic Euler numbers and polynomials of order N}. Note that \(E_{1,n} = E_n\) and \(E_{1,n}(z) = E_n(z)\) are the classical Euler numbers and polynomials, respectively. In this talk we will focus on \(N = 2\) and consider some divisibility properties and give an explicit formula for these numbers. We will also prove similar result for the polynomials. For example, we will show that
\[
E_{2,n} = 1 - \sum_{k=0}^{n-2} \binom{n}{k} 2^{n-k-1} E_{2,k} - 2nE_{2,n-1}
\]

and

\[
E_{2,n} = n \sum_{k=0}^{n-1} \binom{n-1}{k} (-1)^{n-k} E_{2,k} - \sum_{k=0}^{n-1} \left( \frac{1 + (-1)^{n-k}}{2} \right) \binom{n}{k} E_{2,k}.
\]

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