ESIEE AMIENS	**Practical use of fractional differential operators in electrical transmission line analysis**	Author: **Dr Pascal SANSEN**

SUBJECT:

In applied mathematics and mathematical analysis, fractional derivative is a derivative of any arbitrary order, real or complex. Its first appearance is in a letter written to Guillaume de l'Hôpital by Gottfried Wilhelm Leibniz in 1695. As far as the existence of such a theory is concerned, the foundations of the subject were laid by Liouville in a paper from 1832. The autodidact Oliver Heaviside introduced the practical use of fractional differential operators in electrical transmission line analysis circa 1890.

The αth derivative of a function $f(x)$ at a point x is a local property only when α is an integer; this is not the case for non-integer power derivatives. In other words, it is not correct to say that the fractional derivative at x of a function $f(x)$ depends only on values of very near x, in the way that integer-power derivatives certainly do. Therefore, it is expected that the theory involves some sort of boundary conditions, involving information on the function further out. The fractional derivative of a function to order α is often now defined by means of the Fourier or Mellin integral transforms.

EXPECTED RESULTS:

The work required is to understand the Fourier transformation and the fractional derivation, then to look for the application domains of this derivation, essentially in the mechanical domain.