It seems fitting that on this eighth day of the eighth
month of the eighth year of the millennium I should post
eight discussion threads on the eight dimensional algebra
of Octonions, their eight Right Octonion Algebra forms and
eight Left Octonion Algebra forms. And to think eight has
been my lucky number since I was a kid (10 years old :-).

When William Rowan Hamilton created the Quaternions, and
John Graves soon thereafter extended Quaternions to his
Octonions, the world changed. Unfortunately for both, they
were about 150 years ahead of their time. The complexity of
their wonderful creations were too much for the technology
of their day. This was especially true for the Octonions,
causing them to not have a defender such as Quaternions
had in Tait. This set the scene for Gibbs and Heaviside to
champion separate and distinct treatments of gradient,
divergence and curl. Their approach was more appropriate
for the technology and sensibilities of the time. A
separate treatment was easier for mathematicians and
physicists of the day to wrap their minds around. Looking
back, this was a natural and beneficial path that led
perhaps more swiftly to the advances made back then than
the alternatives might have allowed.

However, something was lost in following the path set by
Gibbs and Heaviside. Within the algebra of Quaternions,
gradient, divergence and curl exist in specific
juxtaposition defined naturally and more fundamentally
through the *structure* of the algebra embodied by its
multiplication rules. The differential formalism generating
these familiar forms extends immediately to the eight
dimensions of Octonion Algebra.

Hopefully I have been successful conveying the point that
the structure of Octonion Algebra is of paramount
importance. The structure of Octonion Algebra is directive
in its application to Algebraic Invariance. It determines
the form of differential equations that do not change when
the applied rules of multiplication are changed to other
valid sets within the umbrella of the full description of
the algebra. It is no cosmic coincidence that some of these
invariant differential forms coincide with expectations
set within the well understood arena of Electrodynamics.

One of the many beautiful things about the cover of
Electrodynamics is the harmonious cover of non
Electrodynamic forms. The most conspicuous is the
additional central force. Gravity I would think.

When the conservation formalism for Electrodynamics was
found within the scope of Octonion Algebra, what might have
come along for the ride is the conservation formalism for
the remainder of our physical reality. The differential
coverage of Octonion energy and momentum conservation is
the full description allowed by the structure of the
algebra. There is no more to be seen. If Octonion Algebra
is the structure of nature, all ways energy density can

exist, all methods of energy transport are provided, and
the full balance of action and reaction is known.

The Octonion Algebraic Invariance Law provides a method to
determine homogeneous differential equations of algebraic
constraint. My *religion* is their application with the
conservation methods will lead to a family of solutions
that will demonstrate the *quantum* character of nature.

Rick Lockyer

www.octospace.com

For more information see
http://www.octospace.com/files/Octonion_Algebra_and_its_Connection_to_Physics.pdf