ECE - The Theory of Everything

Horst Eckardt,
A.I.A.S. and UPITEC
(www.aias.us, www.upitec.org)

August 18, 2022

Field equations of

Geometry:

$$\boxed{D \wedge T = R \wedge q}$$

Electrodynamics:

$$\boxed{D \wedge F = R \wedge A}$$

Gravitation/dynamics:

$$\boxed{D \wedge G = R \wedge Q}$$

Fluid dynamics (aether):

$$\boxed{D \wedge F_{\text{fd}} = R \wedge v}$$

Quantum mechanics (wave equation):

$$\boxed{(\Box \ + R)\,\psi = 0}$$

D: derivative operator
$\wedge$: antisymmetric multiplication operator (wedge)
T: torsion
R: curvature
q: tetrad
F: electromagnetic field
A: electromagnetic potential
G: gravitational or acceleration field
Q: gravitational or dynamics potential
F_{fd}: fluid dynamics field
v: fluid velocity
$\Box$: Laplace operator
ψ: wave function

Theorems of Cartan geometry

First and second Maurer-Cartan structure equation:

$$\boxed{\begin{aligned} T &= D \wedge q \\ R &= D \wedge \omega \end{aligned}}$$

Tetrade postulate:

$$\boxed{Dq = 0}$$

Evans lemma (wave equation):

$$\boxed{(\Box \ + R)\, q = 0}$$

Cartan-Bianchi identity:

$$\boxed{D \wedge T = R \wedge q}$$

Alternative Cartan-Bianchi identity:

$$\boxed{D\widetilde{T} = \widetilde{R}}$$

Cartan-Evans identity:

$$\boxed{D \wedge \widetilde{T} = \widetilde{R} \wedge q}$$

Alternative Cartan-Evans identity:

$$\boxed{DT = R}$$

ω: spin connection

$\widetilde{\ }$: operator of Hodge dual