Notes on the Tao paper PhL 6.29.15

I like the style of writing, and it is only 10 pages. It compares 1D to nD integration, and the latter is much more complicated. Unfortunately, I lose the thread when the author starts talking about the form as being a mapping from $E^n \rightarrow E^1$ which is a linear functional. He uses the example of work which yes, is a scalar. The examples I am most used to have a dot product like $\omega = \mathbf{F} \bullet d\mathbf{x}$ where ω is the 1-form and where F is an associated vector function. But this author wants to generalize to manifolds which don't have dot products. It seems that my understanding of a "tangent vector" is not what Tao is talking about, and then he also has "cotangent vectors" which is even more confusing. No pictures, no examples. He likes to define a curve on [0,1] and a surface on $[0,1]^2$ for the variables like u and v. He works in the wedge product, but it just is not done clearly for me. This appears with 2-forms and yes, it is a 2-piped though which some flux flows. The Hodge duality exists only for E^3.

Since I am confused by the tangent and cotangent vectors, I am also confused by his discussion of such vectors being pushed forward and pulled back through a mapping, though I dimly see what this might mean. I need a more systematic discussion.

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