

**ZMATH 2012d.00480**

**Montiel, Mariana; Wilhelmi, Miguel R.; Vidakovic, Draga; Elstak, Iwan**

**Dimensional analogy and different coordinate systems, an onto-semiotic approach.**

Mediterr. J. Res. Math. Educ. 10, No. 1-2, 131-168 (2011).

Summary: Dimensional analogy as a technique and different coordinate systems, apart from their intrinsic mathematical interest, are used in many types of applications in the sciences, engineering and art. As part of the process of the construction of an epistemic network for the subject, the identification of objects, and their dualities, that emerge from this mathematical activity was carried out. The transformation of expressions to content through semiotic functions, and the identification of chains of signifiers and meanings, can be accomplished because of the rich layering and complexity of these mathematical concepts. Questions related to the geometrical aspects of multidimensionality and different coordinate systems, as well as to algebraic methods of transformation were presented to multivariate calculus students, with a questionnaire and formal protocol. Written work and group interviews were analyzed. It was found that dimensional analogy is used by students to create understanding, even when training in specific techniques has not been formalized.

*Classification:* I60 C30 E20 D20

*Keywords:* multivariable calculus; dimensional analogy; coordinate systems; onto-semiotic approach; semiotic functions; epistemic network; multivariate calculus; mathematics and philosophy; epistemology; knowledge; research; didactic transposition; transfer of knowledge; abstract reasoning