1077-11-2469 **Krishna Dasaratha**, **Laure Flapan**, **Chansoo Lee*** (cl4@williams.edu), **Cornelia Mihailia**, **Nicholas G Neumann-Chun**, **Sarah Peluse**, **Matt Stoffregen** and **Thomas A Garrity**. *A Generalized Family of Multidimensional Continued Fractions and its Correspondence to Existing Algorithms.* Preliminary report.

Classical representations of a real number as sequence of integers include its decimal expansion and its continued fraction expansion. Periodicity of the decimal expansion means the real is rational while periodicity of the continued fraction expansion means that the real is a quadratic irrational. In 1848, Hermite asked for a method to represent a real number as a sequence of integers so that periodicity corresponds to periodicity. Attempts to solve this problem (which is still open) are called multi-dimensional continued fractions. We have constructed a family of multidimensional continued fractions by repeatedly subdividing triangles while permuting their vertices after each subdivision. We show that our construction can produce many well-known existing algorithms, including the Brun Algorithm, the Fully Subtractive Algorithm, the triangle map, the Guting Map, and the Monkemeyer Map, allowing us to put all of these seemingly distinct methods into one unified contexts. This has implications ranging from understanding cubic number fields to discovering natural generalizations of Pell's equations to finding fascinating combinatorial analogues of the classical Stern diatomic sequence. (Received September 22, 2011)