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*Hybrid Continued Fractions and  $p$ -adic algorithms, with some applications to cryptography and "unimaginable" numbers.*

This work will continue the author's previous studies on continued fractions and Heron's algorithm, as from his former JMM2017 presentation. Extending the notion of continued fraction to the  $p$ -adic fields, one can find continued fractions which converge in both real and  $p$ -adic topologies to the "same" quadratic irrational number, some of which are given by the Heron's algorithm. The definition can be possibly generalized to other global fields, as left as an open question. We will end the part on hybrid convergence with many numerical examples. After that, we will recall the basic algorithms on the  $p$ -adic fields studied by the author and see some applications of theirs to computer science: applying Heron's algorithm to quickly compute  $p$ -adic square roots, finding new elementary cryptography procedures and some methods to get pseudo-random numbers, calculate last digits of some peculiar very big numbers. (Received September 22, 2018)