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ON EULER'S DIFFERENTIAL METHODS FOR CONTINUED FRACTIONS*

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Dedicated to Ed Saff on the occasion of his 60th birthday

Abstract. A differential method discovered by Euler is justified and applied to give simple proofs to formulas relating important continued fractions with Laplace transforms. They include Stieltjes formulas and some Ramanujan formulas. A representation for the remainder of Leibniz's series as a continued fraction is given. We also recover the original Euler's proof for the continued fraction of hyperbolic cotangent.

Key words. continued fractions, Ramanujan formulas, Laplace transform

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