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This is joint work with Iraj Kalantari. For the number  $\arctan(1/2)/\pi$ , there is a binary expansion algorithm by Plouffe and Borwein/Girgensohn from the 1990's. This number has been shown to be transcendental by Smith and Margolius in 2003 (and its mere irrationality is a consequence of a result by Jahnel in 2010), although suspected not automatic. The present authors have recently presented an algorithm for the spectrum of the same number, essentially counting some sign changes in solutions to a system of difference equations. Here we consider successive alternating approximations for the same number of the form  $1/4 - \arctan(1/3)/\pi$ ,  $1/8 + (1/2)\arctan(1/7)/\pi$ ,  $3/20 - (1/10)\arctan(237/3116)/\pi, \dots$ , that we describe, and explore connections with continued fractions and complexity. (Received September 26, 2012)