A mirror deformation of Markov numbers

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We introduce a natural and new q-deformation of the Markov numbers, called mirror Markov numbers, arising from a deformed squared Markov equation whose solutions specialize to the squares of the classical Markov numbers. We characterize these numbers and define a mutation rule, mirror mutation, that generates them all, together with a geometric realization on a once-punctured sphere with three orbifold points. Our construction yields deformations of the Fibonacci and Pell branches with explicit formulas and recovers several well-known generalized Markov equations by specialization. In particular, we obtain the super Markov numbers and use them to prove a conjecture of Musiker. This is a joint work with L. Bittmann, P. Jouteur, E. Kantarcı Oğuz, and M. Molander.