Optimal solutions for non-consistent singular linear systems of fractional nabla difference equations

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In this talk, we study optimal solutions for a class of non-consistent singular linear systems of fractional nabla difference equations whose coefficients are constant matrices. We take into consideration the cases that the matrices are square with the leading coefficient singular, non-square and square with a matrix pencil which has an identically zero determinant. Then, first we study the system with given non-consistent initial conditions and provide optimal solutions. Furthermore, we consider the system with boundary conditions and provide optimal solutions for two cases, when the boundary value problem is non-consistent and when it has infinite solutions. Finally, we study the Kalman filter for singular non-homogeneous linear control systems of fractional nabla difference equations. Numerical examples are given to justify our theory.

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