

# On a First Order Rational System of Difference Equations with Non-Constant Coefficients

**Yevgeniy Kostrov\***

Xavier University of Louisiana  
New Orleans  
Louisiana  
USA  
ykostrov@xula.edu

**Zachary Kudlak**

Monmouth University  
West Long Branch  
New Jersey  
USA  
zkudlak@monmouth.edu

We investigate the boundedness character of nonnegative solutions of the following nonautonomous rational system

$$\begin{cases} x_{n+1} = \frac{\alpha_n}{\beta_n x_n + y_n} \\ y_{n+1} = \frac{a_n + b_n x_n + c_n y_n}{A_n + B_n x_n + C_n y_n} \end{cases} \quad \text{for } n = 0, 1, \dots$$

with coefficients that are nonnegative sequences and initial conditions which are nonnegative real numbers, such that the denominators are always positive. We present several theorems which establish the limiting behaviors of special cases of the system when the coefficients are periodic, or bounded above and below by positive constants.