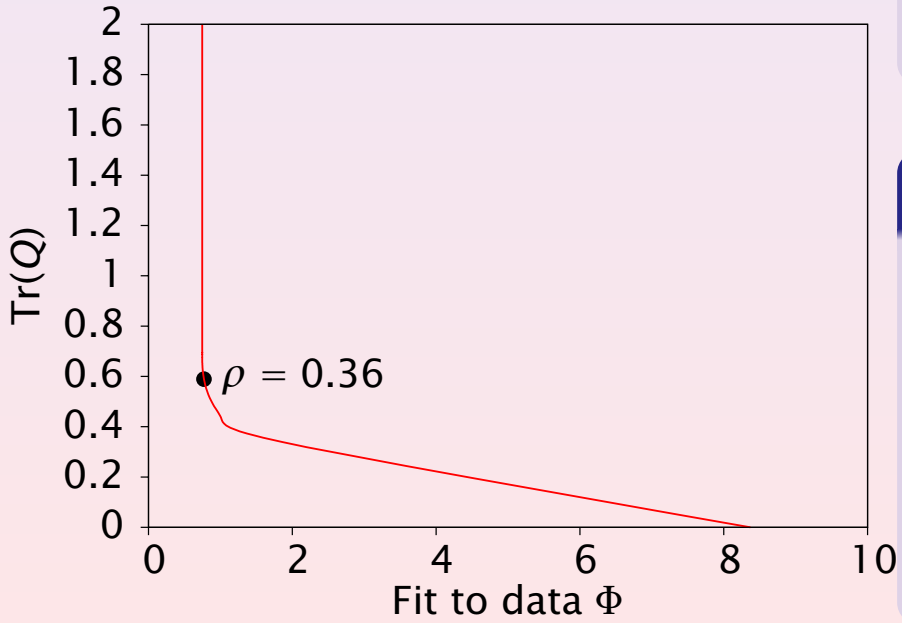
# Improved Chemical Process Operations through Data-Based Disturbance Models

## Model

$$x^+ = Ax + Gw \qquad y = Cx + v$$

$$w \sim N(0, Q) \qquad v \sim N(0, R)$$




## Finding no. of disturbances

$$\min_{Q,R_v} \Psi(Q, R_v) \qquad (1)$$

$$\text{subject to} \qquad Q, R_v \geq 0$$

$$\Psi(Q, R_v) = \Phi(Q, R_v) + \rho \text{tr}(Q)$$

## Theorem

*A solution* $(Q, R_v)$ *to the ALS-SDP in* (1) *is unique if* $dim[Null(M)] = 0$.

$$M = (C \otimes I_n)(I_{n^2} - A \otimes A)^{-1}(F \otimes F)\mathcal{D}_g$$