1119-93-14 **Paul A Fuhrmann*** (fuhrmannbgu@gmail.com), Professsor Paul A Fuhrmann, Department of Mathematics, Ben Gurion University of the Negev, Beer Sheva, Israel. *Partial state reachability of linear systems connected in series.* Preliminary report.

Abstract: In this talk, we describe a solution of the problem of partial state reachability in the case of series connection of linear systems. P.A. Fuhrmann and U. Helmke, *The Mathematics of Networks of Linear Systems*, Springer, New York, 2015, serves as reference to the background information and terminology. Let Σ_i, be the shift realization associated with the right coprime factorization $G_i = N_i D_i^{-1}$, $i = 1, \ldots, q$. The series connection $\Sigma_1 \wedge \cdots \wedge \Sigma_i$ with transfer function $G_{1,\ldots,i} = G_i \cdots G_1 = N_i D_i^{-1} \cdots N_1 D_1^{-1}$, may not be reachable due to possible zero-pole cancellations. We say the series connection $\Sigma_1 \wedge \cdots \wedge \Sigma_q$ is $(i_1, i_2, \ldots, i_r)$-partial state reachable if, for all $1 \leq j \leq r$, the series connection $\Sigma_{i_j} \wedge \Sigma_{1,\ldots,i_j-1}$ is reachable. Letting $N_{1,\ldots,i} D_{1,\ldots,i}^{-1}$ be a right coprime factorization of $G_{1,\ldots,i}$, this is the case if and only if, for all $1 \leq j \leq r$, the polynomial matrices $D_{i_j}, N_{1,\ldots,i_j-1}$ are left coprime. This is the basis for a recursive algorithm that produces an open loop controller. (Received December 07, 2015)