Nonlinear Sytems: Some New Trends in System Identification

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A wide class of nonlinear systems can be described by functional series representations like Volterra- and Fliess - series. It is a known result that Volterra – series approximators as finite dimensional models for nonlinear systems can be constructed as nonlinear moving average (NLMA) operators cascaded with static polynomial nonlinearities. This motivates the use of block – oriented modeling and control of certain nonlinear systems.

This talk will discuss the modeling and identification issues of frequently used block oriented (Wiener – Hammerstein) and bilinear models and some related problem like dynamic inversion and unknown input estimation. Embedding nonlinear models into linear ones (immersion) will be considered, too. An application for obtaining yaw – dynamic models for self a driving car operating at various speeds will be shown for illustration.