

D-DECOMPOSITION REVISITED

Elena Gryazina

`gryazina@ipu.rssi.ru`

*Institute of Control Science,
Russian Academy of Sciences, Moscow, Russia*

The challenging problem in linear control theory is to describe the total set of parameters (controller coefficients or plant characteristics) which provide stability of the system. For the case of one complex or two real parameters and SISO system (with the characteristic polynomial depending linearly on these parameters) the problem can be solved graphically by the use of so called *D*-decomposition. Our goal is to extend the technique and to link it with general $M-\Delta$ framework. On this way we investigate the geometry of *D*-decomposition for polynomials and estimate the number of root invariant regions. Several examples verify that these estimates are tight. We also extend *D*-decomposition for the matrix case. For instance, we partition real axis or complex plane of the parameter k into regions with invariant number of stable eigenvalues of the matrix $A + kB$. Similar technique can be applied to double-input double-output systems with two parameters.