On complex normal forms for the double boundary focus

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We consider planar piecewise polynomial systems with a straight line as separation boundary between the two vector fields. It is assumed that the origin, which belongs to the boundary, is an isolated equilibrium of center/focus type for both vector fields. Thus, we deal with the so called FF case. Working in the complex setting, firstly we study which are the possible normal forms, and secondly, how to exploit these normal forms in computing the Lyapunov constants that characterize the cyclicity of the origin. To illustrate the usefulness of the approach, some examples regarding piecewise quadratic systems are considered; in particular, we show how a piecewise quadratic system with an attractive weak focus from both sides can produce a repulsive weak focus. This is a joint work with Marina Esteban, Emilio Freire, and Francisco Torres.