

# SLOW- FAST SYSTEMS WITH NON REGULAR DISCONTINUITY

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## Abstract

Consider the following model

$$\begin{aligned} X(x, y) &= \left( -bx - \frac{4b^2 + w^2}{4a}y + d, ax + by + c \right), \\ Y(x, y) &= \left( -Bx - \frac{4B^2 + W^2}{4A}y + D, Ax + By + C \right), \end{aligned} \tag{0.1}$$

and  $a, A, b, B, w, W > 0$  with the discontinuity set  $\Sigma = \Sigma_1 \cup \Sigma_2$  where  $\Sigma_1 = \{f_1^{-1}(0); x \geq 0\}$  and  $\Sigma_2 = \{f_2^{-1}(0); y \geq 0\}$  being  $f_1(x, y) = y$  and  $f_2(x, y) = x$ . This system has non regular discontinuity with a non-regular point in  $\Sigma$ . Our goal is apply the regularization of a non-smooth vector field [0.1](#) and the Geometric Singular Perturbation Theory to transform system [\(0.1\)](#) into a slow-fast system making change of parameters to obtain a cylinder which will have the slow dynamic.