Impasse Bifurcations of Constrained Systems

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Abstract. In this paper are studied the generic bifurcations of families
of constrained C^r differential systems of the form

$$a(x, y, \lambda)x' + b(x, y, \lambda)y' = f(x, y, \lambda),$$
$$c(x, y, \lambda)x' + d(x, y, \lambda)y' = g(x, y, \lambda),$$

where (x, y) are plane phase variables and λ is a real parameter. The
analysis is located around the *impasse surface*, defined by $ad - bc = 0$,
where constrained systems differ from ordinary differential equations.

1 Introduction

This paper is concerned with study of the bifurcations of one–parameter families
of planar differential systems of the form

$$
\begin{aligned}
a(x, y, \lambda)x' + b(x, y, \lambda)y' &= f(x, y, \lambda), \\
c(x, y, \lambda)x' + d(x, y, \lambda)y' &= g(x, y, \lambda),
\end{aligned}
\tag{1.1}
$$