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Title: On *limit solutions* for control systems

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Abstract: For a control Cauchy problem

$$\dot{x} = f(t, x, u, v) + \sum_{\alpha=1}^{m} g_\alpha(x)\dot{u}_\alpha, \quad x(a) = \bar{x},$$

on an interval $[a, b]$, we propose in the notion of *limit solution* x that is defined for $\mathcal{L}^1$ impulsive inputs u and for standard, bounded measurable, controls v. Here $\mathcal{L}^1$ denotes the space of everywhere defined Lebesgue integrable functions. The limit solution corresponding to a control u in $\mathcal{L}^1$ is itself a (everywhere defined) function of $\mathcal{L}^1$ and, loosely speaking, it is the limit (in some sense) of standard Carathodory solutions associated to absolutely continuous controls approximating u.

We prove consistency with already existing concepts of standard and impulsive solutions. We also analyze existence issues, and investigate the question whether this notion of solution provides a proper extension of the standard problem with absolutely controls u, i.e. if the subset of trajectories of the latter is dense in the set of trajectories of the former and the two infimum values do coincide.