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Corrigendum

Corrigendum to "Hierarchical trajectory refinement for a class of nonlinear systems" [Automatica 41(4) (2005) 701–708]

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It was recently brought to our attention by Dr. Mario Sigalotti that Theorem 3.2 in Tabuada and Pappas (2005) does not hold under the stated assumptions. In particular, the following example presented by Dr. Mario Sigalotti contradicts Corollary 3.3.

Let $r = k = 1$, $X_M^0(y, z) = \arctan(z)\partial/\partial y$, $X_M^1(y, z) = \partial/\partial z$, $\phi(y, z) = y$. It is easy to check that A.I, A.II, A.III, and (3.4) hold true. Using (2.3) we get $F_N(y, (\alpha, \beta, \gamma)) = \beta$. Therefore, every smooth trajectory $y(\cdot)$ in $\mathbb{R}$ should be a solution of Σ_N. If $|\dot{y}(t)| > \pi/2$ for some $t \in \mathbb{R}$, however, then $y(\cdot)$ cannot be refined to a trajectory of Σ_M.

The problem lies in Lemma 3.1 which does not hold under the stated assumptions. However, it does hold under the stronger assumption

$$[\ker(T\phi), [\ker(T\phi), \mathscr{A}_M]] \subseteq \ker(T\phi) \tag{1}$$

that should replace A.II. Similarly, Corollary 3.3 requires the stronger assumption

$$[\ker(T\phi), \Delta_M^1] \subseteq \ker(T\phi) \tag{2}$$

that should replace (3.4). Note that the previous example does not satisfy (1) since

$$[\ker(T\phi), [\ker(T\phi), X_M^0]] = \operatorname{span}\left\{-\frac{2z}{(1+z^2)^2}\frac{\partial}{\partial y}\right\} \notin \ker(T\phi) = \operatorname{span}\left\{\frac{\partial}{\partial z}\right\}. \tag{3}$$

Reference

Tabuada, P., & Pappas, G. (2005). Hierarchical trajectory generation for a class of nonlinear systems. *Automatica*, *4*(4), 701–708.

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