

Introducing the theory of bonds for Stewart Gough platforms with self-motions

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The talk is based on a manuscript of the author, which has the identical title and is currently under review.

Within this presentation, we transfer the basic idea of bonds, introduced by HEGEDÜS, SCHICHO and SCHRÖCKER for overconstrained closed chains with rotational joints, to the theory of self-motions of parallel manipulators of STEWART-GOUGH (SG) type. We give some basic facts and results on bonds and demonstrate the potential of this theory on the basis of several examples, which also show that the bond theory can be used for different tasks, e.g.:

1. Classification of SG platforms with non-translational self-motions.
2. Checking whether given SG platforms are free of non-translational self-motions.
3. Determination of SG platforms with non-translational self-motions.

Moreover, we present a geometric characterization of all SG platforms with a pure translational self-motion.

In addition, we give the results of our recent work on SG manipulators with multidimensional self-motions, which is currently in preparation. The key to a successful study of this topic is hidden in the subdivision of these self-motions into different types, which are induced by the theory of bonds in a natural way. Based on these preparatory considerations, we present a complete list of all SG platforms, which possess n -dimensional self-motions with $n > 2$. We also give some remarks and a new result on SG platforms with 2-dimensional self-motions, nevertheless a full discussion of this case remains open.

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