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Impact of Steering System on Agricultural Rovers Dynamics in Vineyards/Orchards Applications.

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The agricultural sector is at the centre of an authentical technological revolution. In this context, digitalization is increasingly playing a predominant role in this sector. Indeed, progressively more vehicles and machineries are equipped with IoT devices with the aim to optimize the entire agricultural process within which the machinery is involved according to precision farming principles. From this perspective the use of autonomous driving rover can represent one of the best solutions that best resumes the aforementioned technological trend. Furthermore, agricultural rovers can be the remedy to contrast the decline of agricultural workers ensuring, at the same time, the growing food demand. This work focused on studying the dynamic behaviour of a wheeled agricultural rover, used in orchards or vineyards applications. For this purpose, a model of agricultural rover was developed using a multibody software. In particular, the study aims to compare the behaviour of the same rover equipped with three different kinds of steering system: Ackermann steering, Differential Wheel-Drive steering and Independent Steering. First the parametric model of the rover, used to carry on the simulations, is presented. Then, the three different steering systems and how them are implemented within the model are described. At the end of the analysis, the best system from a dynamic point of view is defined by observing variations in forces and trajectory deviations with respect to a reference path during operations.

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