

Abstract

The present paper is devoted to existence of limit cycles of planar piecewise-linear (PWL) systems with two zones separated by a straight line and singularity of type “focus-focus” and “focus-center”. Our investigation is a supplement to the classification of Freire et al. concerning the existence and number of the limit cycles depending on certain parameters. To prove existence of a stable limit cycle in the case “focus-center” we use a pure geometric approach. In the case “focus-focus” we prove existence of a special configuration of five parameters leading to existence of a unique stable limit cycle, whose period can be found by solving a transcendental equation. An estimate of this period is obtained. Moreover, we apply this theory on a two-dimensional system describing the qualitative behavior of a two-dimensional excitable membrane model.