

EXISTENCE OF SADDLE-TYPE SOLUTIONS FOR A CLASS OF QUASILINEAR PROBLEMS IN \mathbb{R}^2

CLAUDIANOR O. ALVES — RENAN J.S. ISNERI — PIERO MONTECCHIARI

ABSTRACT. The main goal of the present paper is to prove the existence of saddle-type solutions for the following class of quasilinear problems

$$-\Delta_{\Phi}u + V'(u) = 0 \quad \text{in } \mathbb{R}^2,$$

where

$$\Delta_{\Phi}u = \operatorname{div}(\phi(|\nabla u|)\nabla u),$$

$\Phi: \mathbb{R} \rightarrow [0, +\infty)$ is an N-function and the potential V satisfies some technical condition and we have as an example $V(t) = \Phi(|t^2 - 1|)$.

1. Introduction

In this paper, we show the existence of saddle-type solutions for the following class of quasilinear elliptic equations of the form

$$(PDE) \quad -\Delta_{\Phi}u + V'(u) = 0 \quad \text{in } \mathbb{R}^2,$$

where

$$\Delta_{\Phi}u = \operatorname{div}(\phi(|\nabla u|)\nabla u)$$

and $\Phi: \mathbb{R} \rightarrow [0, +\infty)$ is an N-function of the form

$$(1.1) \quad \Phi(t) = \int_0^{|t|} s\phi(s) ds$$

2020 *Mathematics Subject Classification*. Primary: 35A15, 35J62, 34C37.

Key words and phrases. Variational methods; quasilinear elliptic equations; heteroclinic solutions.

C.O. Alves was partially supported by CNPq/Brazil Proc. 304804/2017-7.

R.J.S. Isneri was partially supported by CAPES, Brazil.