

**Author(s):** Catalao, JPS (Catalao, J. P. S.); Pousinho, HMI (Pousinho, H. M. I.); Mendes, VMF (Mendes, V. M. F.)

**Title:** Mixed-integer nonlinear approach for the optimal scheduling of a head-dependent hydro chain

**Source:** Electric Power Systems Research, 80 (8): 935-942 AUG 2010

**Language:** English

**Document Type:** Article

**Author Keywords:** Short-term hydro scheduling (STHS); Mixed-integer nonlinear programming (MINLP); Cascaded reservoirs; Variable head

**KeyWords Plus:** HYDROTHERMAL POWER-SYSTEMS; ELECTRICITY MARKET; GENERATION; ALGORITHM; MODEL; UNITS; FLOW

**Abstract:** This paper is on the problem of short-term hydro scheduling (STHS), particularly concerning a head-dependent hydro chain. We propose a novel mixed-integer nonlinear programming (MINLP) approach, considering hydroelectric power generation as a nonlinear function of water discharge and of the head. As a new contribution to the studies, we model the on-off behavior of the hydro plants using integer variables, in order to avoid water discharges at forbidden areas. Thus, an enhanced STHS is provided due to the more realistic modeling presented in this paper. Our approach has been applied successfully to solve a test case based on one of the Portuguese cascaded hydro systems with a negligible computational time requirement. (C) 2010 Elsevier B.V. All rights reserved.

**Addresses:** [Catalao, J. P. S.; Pousinho, H. M. I.] Univ Beira Interior, Dept Electromech Engrn, P-6201001 Covilha, Portugal; [Mendes, V. M. F.] Inst Super Engrn Lisboa, Dept Elect Engrn & Automat, P-1950062 Lisbon, Portugal

**Reprint Address:** Catalao, JPS, Univ Beira Interior, Dept Electromech Engrn, R Fonte Lameiro, P-6201001 Covilha, Portugal.

**Publisher:** Elsevier Science SA

**Publisher Address:** PO BOX 564, 1001 LAUSANNE, SWITZERLAND

**ISSN:** 0378-7796

**DOI:** 10.1016/j.epsr.2009.12.015

**29-char Source Abbrev.:** ELEC POWER SYST RES

**ISI Document Delivery No.:** 609FD