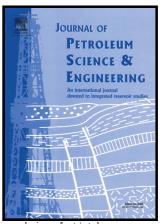
# Author's Accepted Manuscript

A Unified MILP Model for Topological Structure of Production Well Gathering Pipeline Network

Zhang Haoran, Liang Yongtu, Zhang Wan, Wang Bohong, Yan Xiaohan, Liao Qi



PII: S0920-4105(17)30378-9

DOI: http://dx.doi.org/10.1016/j.petrol.2017.03.016

Reference: PETROL3904

To appear in: Journal of Petroleum Science and Engineering

Received date: 1 July 2016 Revised date: 6 March 2017 Accepted date: 7 March 2017

Cite this article as: Zhang Haoran, Liang Yongtu, Zhang Wan, Wang Bohong, Yan Xiaohan and Liao Qi, A Unified MILP Model for Topological Structure of Production Well Gathering Pipeline Network, Journal of Petroleum Science and Engineering, http://dx.doi.org/10.1016/j.petrol.2017.03.016

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

### **ACCEPTED MANUSCRIPT**

# A Unified MILP Model for Topological Structure of Production Well Gathering Pipeline Network

Zhang Haoran, Liang Yongtu, Zhang Wan, Wang Bohong, Yan Xiaohan, Liao Qi

Beijing Key Laboratory of Urban oil and Gas Distribution Technology, China University of Petroleum-Beijing Beijing, 102249

#### Abstract:

Production well gathering pipeline network, usually characterized by various and complex structure and high investment, is one of significant parts of oil-gas field construction. Optimization of production well fluid-gathering system is critical to reducing development cost. A variety of previous research focused on the issue. However, those methods were less applicable for dealing with the challenges of compatibility to various structures, integral optimization and finding the optimum. This paper focuses on stellated pipeline network, cascade dendritic pipeline network and insertion dendritic pipeline network, three common connection structures of gathering pipeline, and establishes a versatile mixed-integer linear programming model with considering terrain and obstacle conditions. Minimizing the total investment is the object of this model. Constraints of central processing facility, manifolds, flow rate, pipeline construction and connection mode are taken into consideration in the model. The optimal topological structure, position of central processing facility, diameter and route of each pipeline are obtained integrally by solving this model with GUROBI solver. Finally, two virtual oil-gas fields and a real-world gas field are taken as examples to verify the reliability and practicality of the model.

#### Keywords:

Oil-gas gathering pipeline network; Topological structure; integral optimization; Mixed-integer linear programming

#### Nomenclature

#### **Abbreviations**

CDPN Cascade dendritic pipeline network.

CPF Central processing facility.

CNY Chinese Yuan.

IDPN Insertion dendritic pipeline network.

MILP Mixed-integer linear programming.

NPC Non-deterministic polynomial complete.

PWGPN Production well gathering pipeline network.

SPN Stellated pipeline network.

Sets and indices

 $a \in A$  Set of numbering of flow rate division

 $(i,j),(i',j'),(i'',j''),(ri_{i,j,k},rj_{i,j,k}) \in I$  Set of coordinate of node in the studied area

 $k, rk_k \in K$  Set of direction of connecting nodes.  $rk_k$  is the opposite

## Download English Version:

# https://daneshyari.com/en/article/5484274

Download Persian Version:

https://daneshyari.com/article/5484274

<u>Daneshyari.com</u>