Tech Science Press

ICCES, 2024, vol.29, no.3
DOI: 10.32604/icces.2024.011157

PROCEEDINGS

Source-Sink Matching Model Focusing on the Feasibility of CO_2 Pipeline Transport

Yubo Jiao[1] and Wei Wang[1,*]

[1] National Engineering Laboratory for Pipeline Safety/MOE Key Laboratory of Petroleum Engineering/Beijing Key Laboratory of Urban Oil and Gas Distribution Technology, China University of Petroleum-Beijing, Changping, Beijing, 102249, China

*Corresponding Author: Wei Wang. Email: w.wang@cup.edu.cn

ABSTRACT

The source-sink matching optimization problem is one of the more important aspects of carbon capture and storage (CCS) system planning studies, and a large number of studies have been conducted using mathematical modeling to assess the feasibility of deployment in the planning region, thus providing important decision support. A framework of optimization system applicable to source-sink matching analysis was constructed based on the structural relationship between directly connected sources and sinks, taking into account multiple factors (transport characteristics, CO_2 injection rate and connection period, etc.), which can ensure the feasibility of CO_2 pipeline transportation operation and improve the safety and reliability of the decision-making of the pipeline transportation part of the source-sink matching optimization problem. In order to be able to represent in the optimization model the pipeline transport characteristics of each potential connection within the planning region, the pipeline transport mass flow relationship was introduced and linearly coupled to the optimization model in the form of a constraint. In addition, the impact of pipeline flow characteristics on the total CO_2 emission reduction in the planning region under different transport conditions was analyzed by considering CO_2 transport in different phases, which provides certain technical support for designating more abundant source-sink matching schemes.

KEYWORDS

Carbon capture and storage (CCS); source-sink matching; mixed integer linear programming (MILP); hydrothermal conditions

Funding Statement: The authors received no specific funding for this study.

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.