# Article information:

Thermo-hydro-chemo-mechanical coupling peridynamic model of fractured rock mass and its application in geothermal extraction - ScienceDirect  
<https://www.sciencedirect.com/science/article/abs/pii/S0266352X22001896?via%3Dihub=>

# Article summary:

1. Geothermal energy is a clean and renewable energy source that has been widely used for power generation in many countries.

2. Thermo-hydro-chemo-mechanical coupling of fractured rock mass plays an important role in geothermal energy extraction.

3. The article introduces a thermo-hydro-chemo-mechanical coupling peridynamic model to simulate the crack propagation mechanism of rock mass under multi-field coupling conditions.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

The article titled "Thermo-hydro-chemo-mechanical coupling peridynamic model of fractured rock mass and its application in geothermal extraction" discusses the development of a numerical model to simulate the behavior of fractured rock mass under thermo-hydro-chemo-mechanical (THCM) coupling conditions. The authors highlight the importance of understanding the multi-field coupling effects in geothermal energy extraction and provide an overview of previous research on thermo-mechanical (TM), hydro-mechanical (HM), and thermo-hydro-mechanical (THM) coupling in fractured rock mass.

The article provides a comprehensive review of the literature on TM, HM, and THM coupling in fractured rock mass, highlighting key findings from previous studies. It discusses various numerical methods used to simulate the failure characteristics of rock mass under multi-physical fields, including finite element method (FEM), phase field method (PFM), discrete element method (DEM), discontinuous deformation analysis (DDA), and peridynamics. The advantages and limitations of each method are discussed.

The authors then propose a THCM coupling peridynamic model for simulating the behavior of fractured rock mass. They derive the governing equations for the model and describe the implementation process. A simple numerical case is presented to verify the correctness and accuracy of the model.

Overall, the article provides a comprehensive overview of previous research on multi-field coupling in fractured rock mass and presents a new numerical model for simulating THCM coupling. The article is well-written and organized, making it easy to follow the authors' arguments.

However, there are several potential biases and limitations in this article that should be considered. Firstly, while the authors discuss various numerical methods for simulating multi-field coupling in fractured rock mass, they do not provide a critical evaluation or comparison of these methods. It would be helpful to discuss the advantages and disadvantages of each method more explicitly.

Secondly, the article focuses primarily on the development of the THCM coupling peridynamic model and its application in geothermal extraction. While this is an important topic, the authors do not discuss potential risks or challenges associated with geothermal energy extraction, such as induced seismicity or groundwater contamination. It would be valuable to include a discussion of these issues to provide a more balanced perspective.

Additionally, the article does not explore potential counterarguments or alternative approaches to simulating multi-field coupling in fractured rock mass. It would be beneficial to discuss any limitations or criticisms of the peridynamic model and consider alternative numerical methods that could be used.

Furthermore, the article does not provide sufficient evidence or data to support some of the claims made. For example, when discussing previous research on TM and HM coupling, the authors mention that "numerous beneficial results have been obtained," but they do not provide specific examples or references to support this claim.

Finally, it is worth noting that the article is published in ScienceDirect, which is a reputable scientific journal platform. However, it is always important to critically evaluate any scientific article and consider potential biases or limitations.

In conclusion, while the article provides a comprehensive overview of previous research on multi-field coupling in fractured rock mass and presents a new numerical model for simulating THCM coupling, there are several biases and limitations that should be considered. The authors could provide a more critical evaluation of different numerical methods, discuss potential risks and challenges associated with geothermal energy extraction, explore alternative approaches and counterarguments, and provide more evidence to support their claims.

# Topics for further research:

* Induced seismicity in geothermal energy extraction
* Groundwater contamination in geothermal energy extraction
* Limitations of peridynamic model in simulating multi-field coupling in fractured rock mass
* Alternative numerical methods for simulating multi-field coupling in fractured rock mass
* Criticisms of peridynamic model in simulating THCM coupling
* Specific examples of beneficial results obtained from previous research on TM and HM coupling in fractured rock mass

# Report location:

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