Simplification of MATRA Code Input Parameters and Development of MATRA GUI

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1. Introduction

MATRA code is a sub-channel analysis code developed by KAERI. The input type of the MATRA code consists of 14 input cards and the input type was used for an old-style computer. In the input, many parameters are reiterated and some parameters are useless. In this study, the 14 input cards are analyzed to be simplified and regrouped as 6 groups. And based on the simplified 6 groups, the MATRA GUI program is developed.

2. Simplification of MATRA code INPUT and Development of MATRA GUI Program

2.1 Structure of MATRA INPUT[1]

Table 1 shows the structure of the MATRA code. The MATRA code consists of Initial Card, Case Control card, and 12 Group Data Cards. Also, each card requires additional data cards. Figure 1 shows the input format.

Table 1. Structure of INPUT

Group No.	Description	Case	
		First	Subsequent
–	Initial card	required	not required
–	Case control card	required	required
1	Fluid properties	required	optional
2	Friction factor, heat transfer coefficient, and two‐phase flow correlations	required	optional
3	Axial heat flux distribution	required	optional
4	Channel layout and dimensions	required	optional
5	Channel area variation	optional	optional
6	Gap spacing variation	optional	optional
7	Wire wrap and grid spacer information	optional	optional
8	Rod layout, dimensions, and properties	required	optional
9	Calculation control	required	optional
10	Lateral transport models	required	optional
11	Operating conditions and transient forcing functions	required	optional
12	Output display options	required	optional

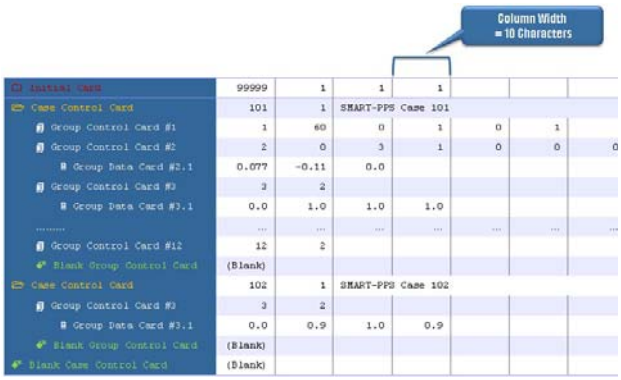


Figure 1. INPUT Format

2.2 Simplification of MATRA INPUT

In this study, dependencies, between the 14 input cards, are analyzed and regrouped as 6 groups (“Model”, “Fluid info”, “Calculation Option”, “Solver Control”, “Operation condition”, “Run”). Figure 2 shows simplified input structure.

The group “Model” consists of “Rod Info”, “Sub-channel Info”, “Gap Info”, “Wire Wrap and Grid Spacer Info”, and “Lateral Transport Model”. And layout and dimension of a target model are determined in this group. And parameters, in the group “Fluid Info” and the group “Calculation Option”, are determined to depend on the group “Model”.

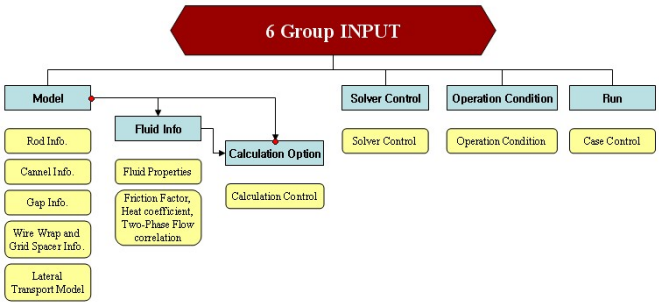
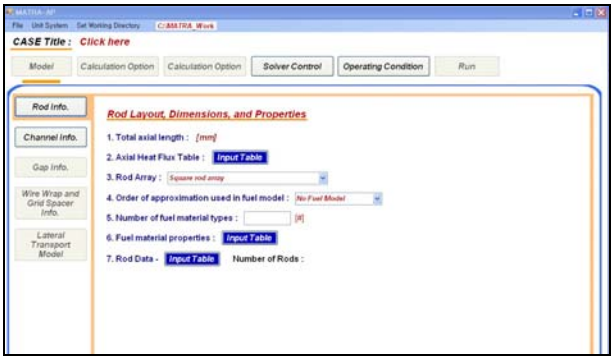


Figure 2. Structure of 6 Group INPUT

2.3 Development of MATRA GUI Program

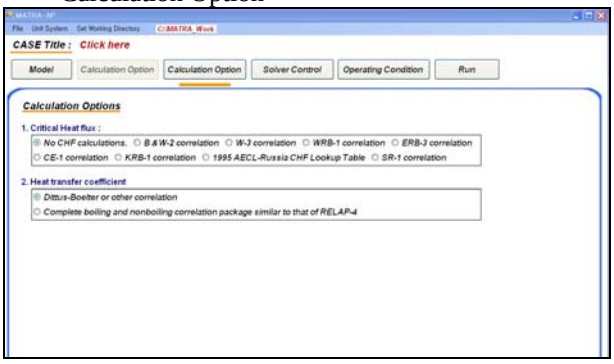
By using the new input structure, the MATRA GUI program is developed in this study. By using the program, it is expected that the possibility of error will be reduced and the user’s convenience improved.

- Model form



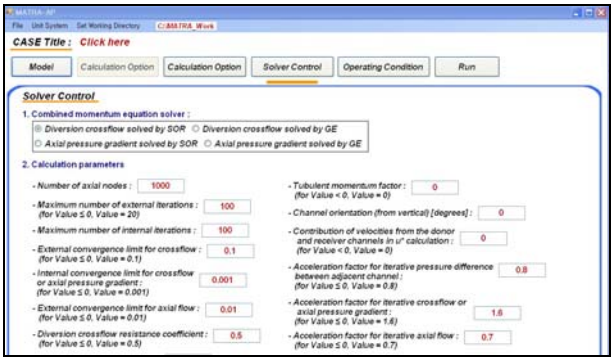
Dimension and layout of rod, channel, gap, wire wrap and grid, and lateral transport model are determined in this form

- Calculation Option



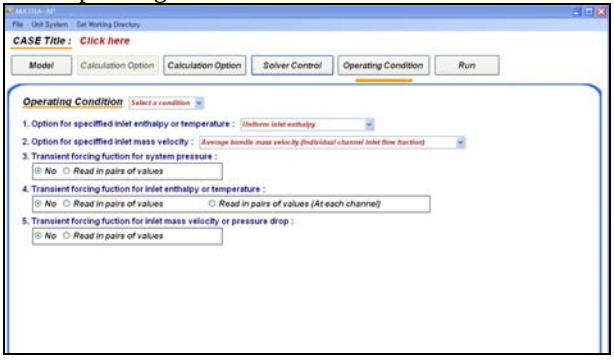
According to the group "Model", Only required calculation options are proposed in this form.

- Solver Control



In this form, parameters, such as time step and convergence limits, are determined.

- Operating Condition



In this form, operation conditions such as inlet condition and transient forcing function are determined.

3. Conclusions

Many parameters in the original MATRA input were reiterated and not used in the calculation and in the MATRA input format errors easily occur.

In this study, The MATRA code input was simplified and by using the simplified input, the MATRA GUI program was developed. The GUI program could reduce the possibility of errors and improve the user's convenience.

The MATRA GUI program is expected to be upgraded for SMART reactor core sub-channel analysis and the program to contribute to export of the MATRA code.

REFERENCES

[1] Y. J. Yoo, D. H. Hwang, T. H. J, "Development of Subchannel Analysis Code MATRA (Ver. α)", KAERI/TR-1033/98, Korea Atomic Energy Research Institute, April 1998.