# A Study on A Fault Diagnosis Method Using Influence Diagrams

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17

,                    (Emergency Operating Procedure)

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.

(SBLOCA)                                    (SGTR)

,                                      ,

.                                    Influence Diagrams        Fuzzy

Logic              .

## Abstract

In complex systems, it is necessary to model a logical representation of the overall system interaction with respect to the individual subsystems. In this study the Influence Diagram has been especially applied for modeling EOPs (Emergency Operating Procedures) and fault process for a strange event. Fuzzy Logic is also used for quantification and selection of the probable success path in systems under abnormal situations in order to diagnose the faults and to analyze causes of the situations. This methodology using Influence Diagrams and Fuzzy theory has been applied for representing the dependency behavior (feedback and dependency, etc) and uncertain behaviors of complex systems, In this study, a methodology to diagnose the confusing faults such as SGTR and SBLOCA has been introduced and applied.

**1.**

. IAEA

10E-1                                                                                    [1].

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.

, SGTR, SBLOCA

.

**2.**

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[2].

.                                                    ,

,

.                                        Standard  Post  Trip  Actions,  Diagnostic  Actions,

Optimal recovery procedure, Functional recovery Procedure      4

1        .

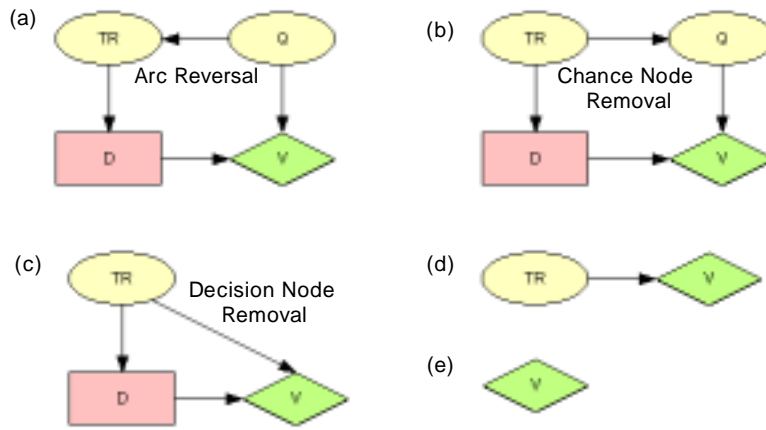(Standard Post Trip Actions : SPTA)

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.                                                ,        SGTR,  SBLOCA

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.

. 1. [7]

**3.**

.

(Influence Diagrams) .

(Networks) .

. Bayesian

.

.

(Value Node)

. 4

2 .

, (Arc Reversal X Y , X Y

, Y X

3

.                              X    Y                                                                    Bayesian
        .               (Sink Node)

                                    .      ,                                                                  .

            (Chance  Node)          X              Y

                                .              Y    X

        .        Total  Probability                      .              ,                    (Decision  Node)


        [3-6].



(a)                                    (b)
        Arc Reversal                           Chance Node
                                               Removal

(c)                                    (d)
        Decision Node
        Removal

                                       (e)

                            . 2. Bayesian

## 4.

### 4.1

                    (SBLOCA)                      $0.008ft^2$        $0.02ft^2$
                        .

                                    ,

                    .

                .                                                                                              ,

                                                                                    .

                                                                            ,

                        .          ,

                                                                                                        (

    410psia,        350   )              ,                              .

                    (SGTR)

        400gpm                                                        135gpm


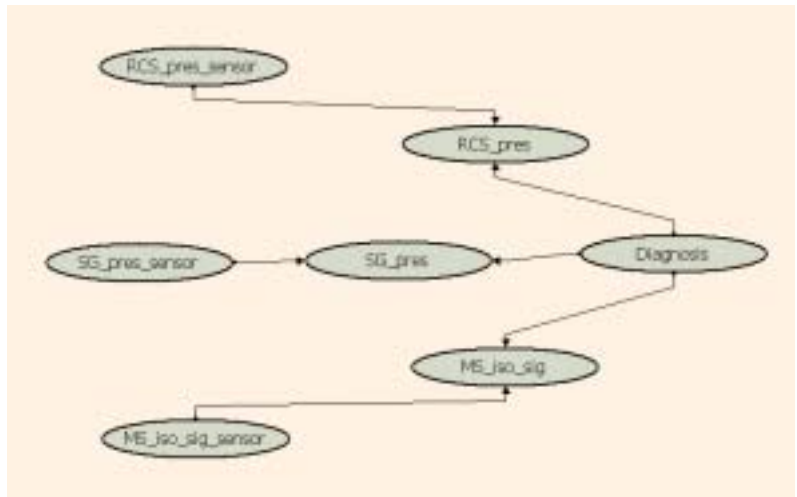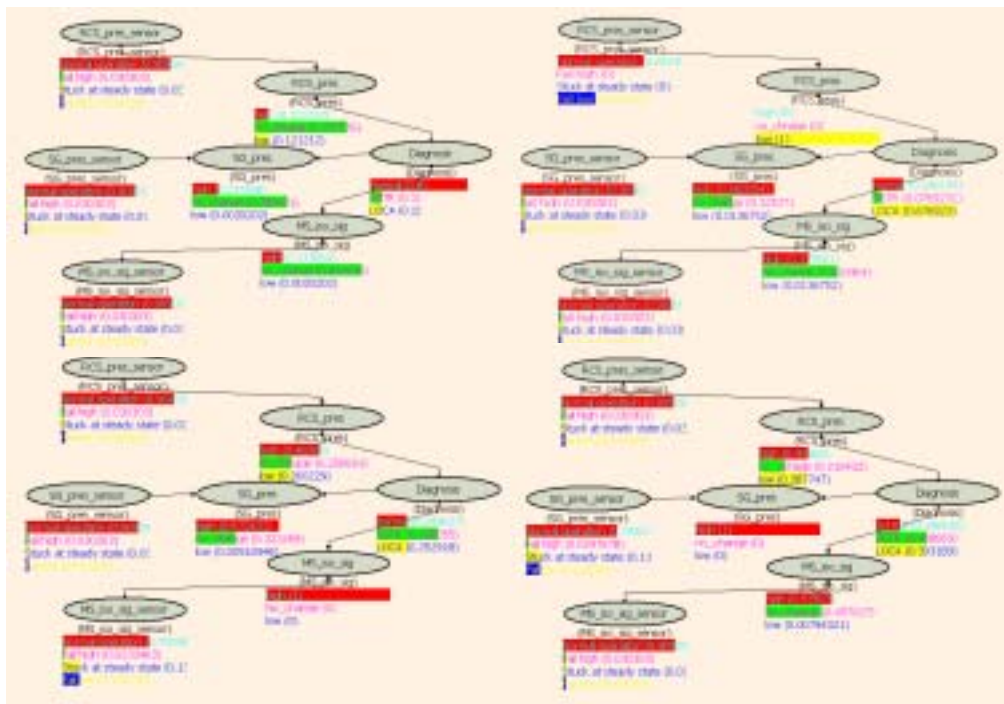                                                                                    4

.

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. ,

(2,250psia) (1,070psia) .

,

. .

[7].

.

[8]. (RCS_pres) (SG_pres)

(MS_iso_sig) .

evidence "high", "no change", "low"

.

RCS_pres_sensor

RCS_pres

SG_pres_sensor → SG_pres ← Diagnosis

MS_iso_sig

MS_iso_sig_sensor

. 3. , ,

.1.

| | | |
|---|---|---|
| 1. | Diagnosis | |
| 2. | RCS_pres | RCS |
| 3. | SG_pres | S/G |
| 4. | MS_iso_sig | |
| 5. | RCS_pres_sensor | RCS |
| 6. | SG_pres_sensor | S/G |
| 7. | MS_iso_sig_sensor | |

.

, , ,

. fuzzy    fuzziness

.

.    (translation rule)

.    ,

,    ,    ,    ,    ,

.    (linguistic approximation)

.

.

.[9-10]

**4.2**

"no change"    "normal"    . E

,    .

RCS_pres

"low"    LOCA    .

"MS_iso_sig"    "high"    SGTR    .

(SG_pres)

.



. 4.

**4.3**

-02 " "

. , -01 " " .

SBLOCA SGTR

. ,

, SBLOCA, SGTR . " " FSAR(Final Safety Analysis

Report) .

.2.

| | | | |
|---|---|---|---|
| ACC_DIAGNOSIS | | SG_PR_SENSOR | |
| RDT_PR | | SG_LEV_SENSOR | |
| RDT_LEV | | SG_RAD_SENSOR | |
| RDT_TEMP | | CONT_PR_SENSOR | |
| SG_PR | | CONT_HUM_SENSOR | |
| SG_LEV | | CON_RAD_SENSOR | |
| SG_RAD | | PRZ_PR_SENSOR | |
| CONT_PR | | PRZ_LEV_SENSOR | |
| CONT_HUM | | RWT_LEV_SENSOR | |
| CON_RAD | | RAS | |
| PRZ_PR | | AFAS | |
| PRZ_LEV | | MSIS | |
| RWT_LEV | | CSAS | |
| RDT_PR_SENSOR | | CIAS | |
| RDT_LEV_SENSOR | | SIAS | |
| RDT_TEMP_SENSOR | | | |

Influence Diagram

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. 5. Influence Diagram

**5.**

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, SGTR,

SBLOCA

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iTRS .

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[2]                    , "        3&4                         ".
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