数理最適化問題における不確実性モデルの展開とその応用

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```
研究発表
 (1) 学会誌等
@article {MR2107466,
    AUTHOR = {Kurano, Masami and Yasuda, Masami and Nakagami, Jun-Ichi and
              Yoshida, Yuji},
     TITLE = {A fuzzy stopping problem with the concept of perception},
   JOURNAL = {Fuzzy Optim. Decis. Mak.},
  FJOURNAL = {Fuzzy Optimization and Decision Making. A Journal of Modeling
              and Computation Under Uncertainty},
    VOLUME = \{3\},\
      YEAR = \{2004\},\
    NUMBER = \{4\},
     PAGES = \{367 - 374\},\
      ISSN = \{1568-4539\},\
   MRCLASS = \{60G40\},\
  MRNUMBER = \{MR2107466\},\
@article {MR2074206,
    AUTHOR = {Li, Jun and Yasuda, Masami},
     TITLE = {Lusin's theorem on fuzzy measure spaces},
   JOURNAL = {Fuzzy Sets and Systems},
  FJOURNAL = {Fuzzy Sets and Systems. An International Journal in
              Information Science and Engineering,
    VOLUME = \{146\},\
      YEAR = \{2004\},\
    NUMBER = \{1\},
     PAGES = \{121-133\},\
      ISSN = \{0165-0114\},\
     CODEN = \{FSSYD8\},\
   MRCLASS = \{28E10 (03E72)\},\
  MRNUMBER = \{MR2074206\},\
MRREVIEWER = \{Wolfgang N\{Y''a\}ther\},\
@article {MR2061154,
    AUTHOR = {Wang, Dabuxilatu and Yasuda, Masami},
     TITLE = {Some asymptotic properties of point estimation with
```

```
{$n$}-dimensional fuzzy data},
   JOURNAL = {Statistics},
  FJOURNAL = {Statistics. A Journal of Theoretical and Applied Statistics},
    VOLUME = \{38\},
      YEAR = \{2004\},\
    NUMBER = \{2\},
     PAGES = \{167-181\},\
      ISSN = \{0233-1888\},\
   MRCLASS = \{62F12 (62A01)\},\
  MRNUMBER = \{MR2061154\},\
}
@article {MR2052989,
    AUTHOR = {Li, Jun and Yasuda, Masami},
     TITLE = {Egoroff's theorem on monotone non-additive measure spaces},
   JOURNAL = {Internat. J. Uncertain. Fuzziness Knowledge-Based Systems},
  FJOURNAL = {International Journal of Uncertainty, Fuzziness and
              Knowledge-Based Systems},
    VOLUME = \{12\},
      YEAR = \{2004\},\
    NUMBER = \{1\},\
     PAGES = \{61-68\},\
      ISSN = \{0218-4885\},
   MRCLASS = \{28A10 (28E10)\},\
  MRNUMBER = \{MR2052989 (2005c:28005)\},\
MRREVIEWER = \{Endre Pap\},\
}
@article {MR2023161,
    AUTHOR = {Yoshida, Y. and Yasuda, M. and Nakagami, J. and Kurano, M.},
     TITLE = {A multiobjective fuzzy stopping in a stochastic and fuzzy
              environment},
      NOTE = {Applied stochastic system modeling (Kyoto, 2000)},
   JOURNAL = {Comput. Math. Appl.},
  FJOURNAL = {Computers \( \) \& Mathematics with Applications. An International
              Journal},
    VOLUME = \{46\},
      YEAR = \{2003\},\
```

```
NUMBER = \{7\},
     PAGES = \{1165 - 1172\},\
      ISSN = \{0898-1221\},\
     CODEN = \{CMAPDK\},\
   MRCLASS = \{60A05 (60G40)\},\
  MRNUMBER = \{MR2023161\},\
}
@article {MR2006780,
    AUTHOR = {Yoshida, Y. and Yasuda, M. and Nakagami, J. and Kurano, M.},
     TITLE = {Fuzzy stopping problems in continuous-time fuzzy stochastic
               systems},
   JOURNAL = {Fuzzy Sets and Systems},
  FJOURNAL = {Fuzzy Sets and Systems. An International Journal in
               Information Science and Engineering,
    VOLUME = \{139\},\
      YEAR = \{2003\}.
    NUMBER = \{2\},
     PAGES = \{349 - 362\},\
      ISSN = \{0165-0114\},\
     CODEN = \{FSSYD8\},\
   MRCLASS = \{62L15 (90C40 90C70 93C42)\},\
  MRNUMBER = \{MR2006780\},\
}
@article {MR1998509,
    AUTHOR = {Kurano, Masami and Yasuda, Masami and Nakagami, Jun-ichi and
               Yoshida, Yuji},
     TITLE = {A fuzzy stopping problem with the concept of perception},
      NOTE = {Mathematics of decision-making under uncertainty (Japanese)
               (Kyoto, 2002)},
   JOURNAL = {S\u224=urikaisekikenky\u224=usho K\u224=oky\u224=uroku},
  FJOURNAL = {S\frac{1}{2}}=urikaisekikenky\frac{1}{2}=usho K\frac{1}{2}=uroku},
    NUMBER = \{1306\},\
      YEAR = \{2003\}.
     PAGES = \{40-46\},\
   MRCLASS = \{62L15\},\
  MRNUMBER = \{MR1998509\},\
```

```
}
@article {MR1986973,
    AUTHOR = {Kurano, Masami and Yasuda, Masami and Nakagami, Jun-Ichi and
               Yoshida, Yuji},
     TITLE = {Markov decision processes with fuzzy rewards},
   JOURNAL = {J. Nonlinear Convex Anal.},
  FJOURNAL = {Journal of Nonlinear and Convex Analysis. An International
               Journal},
    VOLUME = \{4\},
      YEAR = \{2003\},\
    NUMBER = \{1\},
     PAGES = \{105-115\},\
      ISSN = \{1345-4773\},\
   MRCLASS = \{90C40 (90C70)\},\
  MRNUMBER = \{MR1986973 (2004b:90142)\},\
MRREVIEWER = \{Milan Mare\{ \{ \{ \} \} \} \}\}.
@article {MR1954361,
    AUTHOR = {Yoshida, Yuji and Yasuda, Masami and Nakagami, Jun-ichi and
               Kurano, Masami},
     TITLE = {Optimization problems for fuzzy random variables and their
               application to finance},
      NOTE = {Development of the optimization theory for the dynamic systems
               and their applications (Japanese) (Kyoto, 2002)},
   JOURNAL = {S\u224=urikaisekikenky\u224=usho K\u224=oky\u224=uroku},
  FJOURNAL = {S\frac{1}{2}}=urikaisekikenky\frac{1}{2}=usho K\frac{1}{2}=uroku},
    NUMBER = \{1263\},\
      YEAR = \{2002\},\
     PAGES = \{160-170\},\
   MRCLASS = \{28E10 (91B28)\},\
  MRNUMBER = \{MR1954361\},\
@article {MR1954357,
    AUTHOR = {Kurano, Masami and Yasuda, Masami and Nakagami, Jun-ichi and
               Yoshida, Yuji},
     TITLE = {An interval matrix game and its extensions to fuzzy and
```

```
stochastic games},
      NOTE = {Development of the optimization theory for the dynamic systems
               and their applications (Japanese) (Kyoto, 2002)},
   JOURNAL = {S\u224=urikaisekikenky\u224=usho K\u224=oky\u224=uroku},
  FJOURNAL = {S¥=urikaisekikenky¥=usho K¥=oky¥=uroku},
    NUMBER = \{1263\},\
      YEAR = \{2002\},\
     PAGES = \{103-116\},\
   MRCLASS = \{91A15\},\
  MRNUMBER = \{MR1954357\},\
}
@article {MR1930742,
    AUTHOR = {Kurano, Masami and Yasuda, Masami and Nakagami, Jun-ichi and
               Yoshida, Yuji},
     TITLE = {An approach to stopping problems of a dynamic fuzzy system},
   JOURNAL = {Fuzzy Sets and Systems},
  FJOURNAL = {Fuzzy Sets and Systems. An International Journal in
              Information Science and Engineering,
    VOLUME = \{131\},\
      YEAR = \{2002\},\
    NUMBER = \{2\},
     PAGES = \{225-233\},\
      ISSN = \{0165-0114\},\
     CODEN = \{FSSYD8\},\
   MRCLASS = {93C42 (60G40)},
  MRNUMBER = \{MR1930742\},\
@article {MR1922527,
    AUTHOR = {Yoshida, Yuji and Yasuda, Masami and Nakagami, Jun-ichi and
              Kurano, Masami},
     TITLE = {Americal options with uncertainty of the stock prices: the
               discrete-time model},
      NOTE = {Mathematical decision making under uncertainty (Japanese)
              (Kyoto, 2001)},
   JOURNAL = {S¥=urikaisekikenky¥=usho K¥=oky¥=uroku},
  FJOURNAL = {S\frac{2}{3} = urikaisekikenky\frac{2}{3} = usho K\frac{2}{3} = uroku},
```

```
NUMBER = {1252},

YEAR = {2002},

PAGES = {174--180},

MRCLASS = {91B28},

MRNUMBER = {MR1922527},

}
```

(2) 口頭発表

- ・ "A continuous-time optimal stopping model under fuzzy stochastic systems", Y.Yoshida, M.Yasuda, J. Nakagami and M.Kurano, 2002 年 7 月(ベドロヴァ、ポーランド)OSSG2002.
- ・"American put option models with uncertainty of stock prices in financial engineering", Y.Yoshida, M.Yasuda, J. Nakagami and M.Kurano, 2002 年 7 月(セントペテルスブルグ、ロシア)10th ISDG.
- · "An interval matrix game and its applications to fuzzy matrix game and interval stochastic game", M.Kurano, M.Yasuda, J. Nakagami and Y.Yoshida, 2002 年 8 月 (北京,中国), 9 th Bellman Continuum.
- ・"The pricing of American put option under uncertainty of stock prices", Y.Yoshida, M.Yasuda, J. Nakagami and M.Kurano, 2002 年 9 月(シャモニー, フランス) 2nd SRMFIPR.
- · A Discrete-time Portfolio Model with Uncertain Stock Prices, 吉田祐治, 安田正實, 中神潤一, 蔵野正美, 日本数学会(東京大, 2003 年 3 月 23-26 日),
- · A fuzzy stopping problem with the concept of perception: The infinite horizon case, 蔵野正美,安田正實,中神潤一,吉田祐治,日本数学会(千葉大,2003年9月24-27日)
- ・A discrete-time Consumption and Wealth Model under Uncertainty, 吉田祐治, 安田正實, 中神潤一, 蔵野正美,日本オペレーションズリサーチ学会(慶応大, 2003年3月18-19日),
- ・A Dynamic Decision Making Model with an Objective Function on Fuzzy Preferences, 蔵野正美, 安田正實, 中神潤一, 吉田祐治, 日本オペレーションズリサーチ学会(早稲田大, 2004/March/17-18)
- "Pseudo-Convergence of measurable functions on Sugeno fuzzy measure space" J.Li, Y.Ouyang, M.Yasuda, JCIS2003(North Carolina, USA, Sep.26-30,2003) Proceeding FTT 56-59.
- · "An approach to maximum likelihood estimation with fuzzy random variables via support function" by D.Wang, M.Yasuda, JCIS2003(North Carolina, USA,

Sep.26-30,2003) Proceeding FTT 60-63.

- ·「Fuzzy perceptive values for MDPs with discounting」 蔵野正美,安田正實,中神潤一,吉田祐治(RIMS, 2004 年 11 月京都)
- ・「距離空間上での非加法性ファジィー測度に関する収束の新定義とその性質」李軍, 宋金傑,安田正實(RIMS, 2004 年 11 月京都)
- ・「セミマルコフ過程の一般効用最適化」門田良信,蔵野正美,安田正實, Bulletin of Informatics and Cybernetics, 統計科学研究会(2004 年 12 月福岡)
- "Dynamic Programming creates The Golden Ratio, too", Iwamoto,S and Yasuda,M., ICOTA6(Ballarat, Australia, 9-11 Dec. 2004), Abstract pp.47.
- "Regrete optimality in semi-Markov decision Processes with an absorbing set", Kadota, Y., M.Kurano and M.Yasuda, ICOTA6(Ballarat, Australia, 9-11 Dec. 2004) ICOTA6(Ballarat, Australia, 9-11 Dec. 2004), Proceeding paper No.44.
- ・"Fuzzy perceptive values for stopping models and MDPs", 蔵野正美, 安田正實, 中神潤一, 吉田祐治, 日本オペレーションズ・リサーチ学会 (2005 年 3 月, 東京農工大)
- · "Fuzzy optimality equations for perceptive MDPs", 蔵野正美,安田正實,中神潤一,吉田祐治,日本数学会(2005年3月,日本大学)

(3) 出版物

@incollection {MR2104376,

AUTHOR = {Yoshida, Yuji and Yasuda, Masami and Kurano, Masami and Nakagami, Jun-ichi},

TITLE = {Stopping game problem for dynamic fuzzy systems},

BOOKTITLE = {Advances in dynamic games},

SERIES = {Ann. Internat. Soc. Dynam. Games},

 $VOLUME = \{7\},\$

 $PAGES = \{211-221\},\$

PUBLISHER = {Birkh*"auser Boston},

 $ADDRESS = \{Boston, MA\},\$

 $YEAR = \{2005\},\$

 $MRCLASS = \{60G40 (91A25)\},\$

 $MRNUMBER = \{MR2104376\}.$

@incollection {MR2040391,

}

AUTHOR = {Yoshida, Yuji and Yasuda, Masami and Nakagami, Jun-Ichi and

```
Kurano, Masami},
     TITLE = {The mean value with evaluation measures and a zero-sum
              stopping game with fuzzy values},
 BOOKTITLE = {Game theory and application, IX (Petrozavodsk, 2002)},
     PAGES = \{219-225\},\
 PUBLISHER = {Nova Sci. Publ.},
   ADDRESS = {Hauppauge, NY},
      YEAR = \{2003\},\
   MRCLASS = \{60G40 (91A05 91A25)\},\
  MRNUMBER = \{MR2040391\},\
}
@incollection {MR2022427,
    AUTHOR = {Kurano, Masami and Yasuda, Masami and Nakagami, Jun-ichi},
     TITLE = {Interval methods for uncertain {M}arkov decision processes},
 BOOKTITLE = {Markov processes and controlled Markov chains (Changsha,
              1999)},
     PAGES = \{223-232\},\
 PUBLISHER = {Kluwer Acad. Publ.},
   ADDRESS = {Dordrecht},
      YEAR = \{2002\},\
   MRCLASS = \{90C40\},\
  MRNUMBER = \{MR2022427 (2004i:90182)\},\
}
研究成果による工業所有権等の出願・取得状況
```

研 究 成 果 の添付資料 以下のページには、資料の添付を行います。

なし