






1.

(A)	(B)	(C)
 <p>d, A, d가</p> <p>FIER=1</p>	 <p>a d 가 28%가</p> <p>FIER=1.28</p>	 <p>d 가 45%</p> <p>FIER=2.2</p>

가 (C)가
(A)가
pc 가 (B)
(A)가

3.

가

$$FIER = \frac{4L}{d} \quad (3)$$

Naaman

가

1

(A)

,

(C)

(A)

(indent) , ,

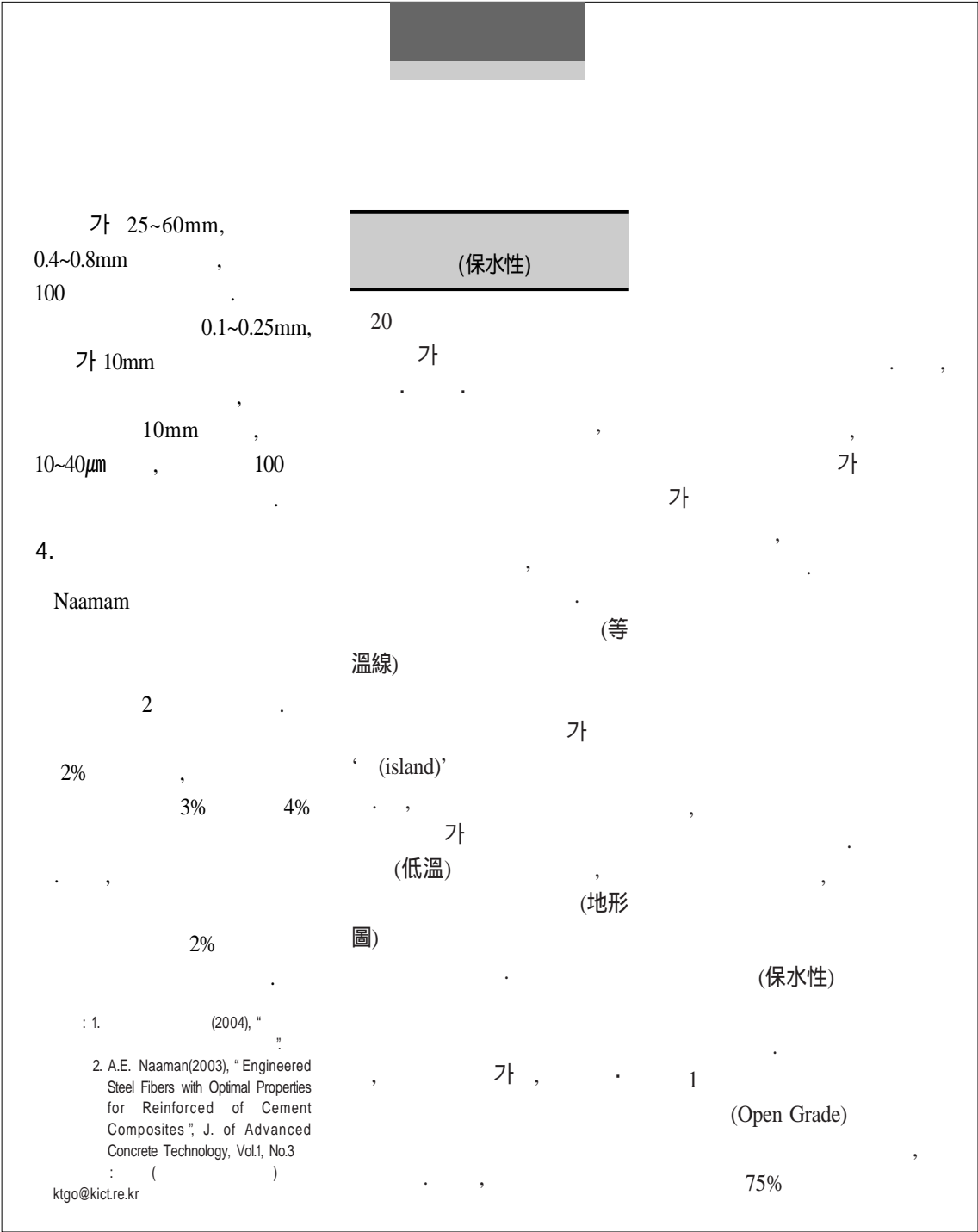
,

가

2.

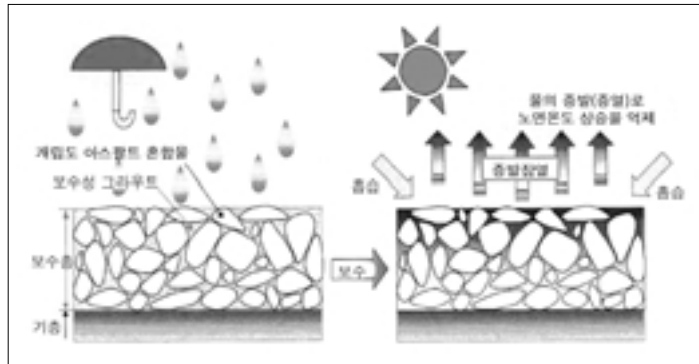
(V_f)

	V _f	
FRC : Fiber Reinforced Concrete	V _f 2%	
HPFRCC : High Performance Fiber Reinforced Cement Composites()	V _f (V _f)critical V _f 1%	
Shotcrete	V _f 3%	
	4% V _f 7%	
SIMCON()	4% V _f 6%	Slurry Infiltrated Mat Concrete
SIMCON(PVA)	V _f 2%	
SIFCON()	4% V _f 15%	Slurry Infiltrated Fiber Concrete

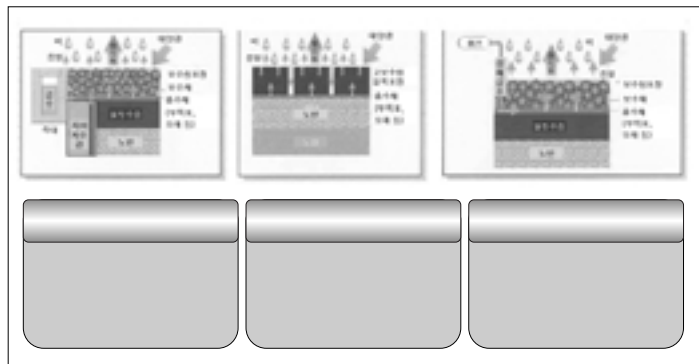


(潛熱)

2



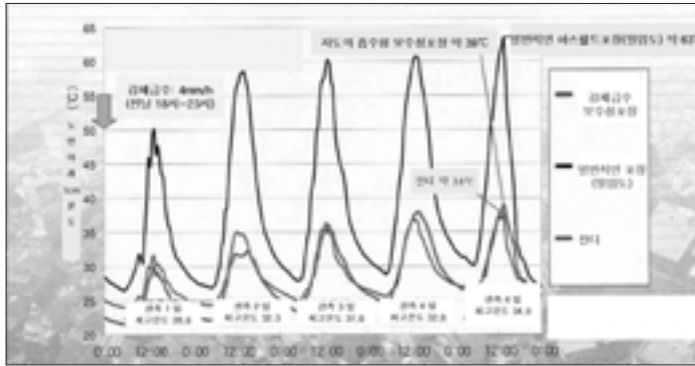
1.



2.

가

3



3.

SCE-UA, () 가

heuristic

: 1. 環境舗装東京プロジェクト フィールド
 實驗, 日本 國土交通省 關東地方整備
 局 關東技術事務所, 2004

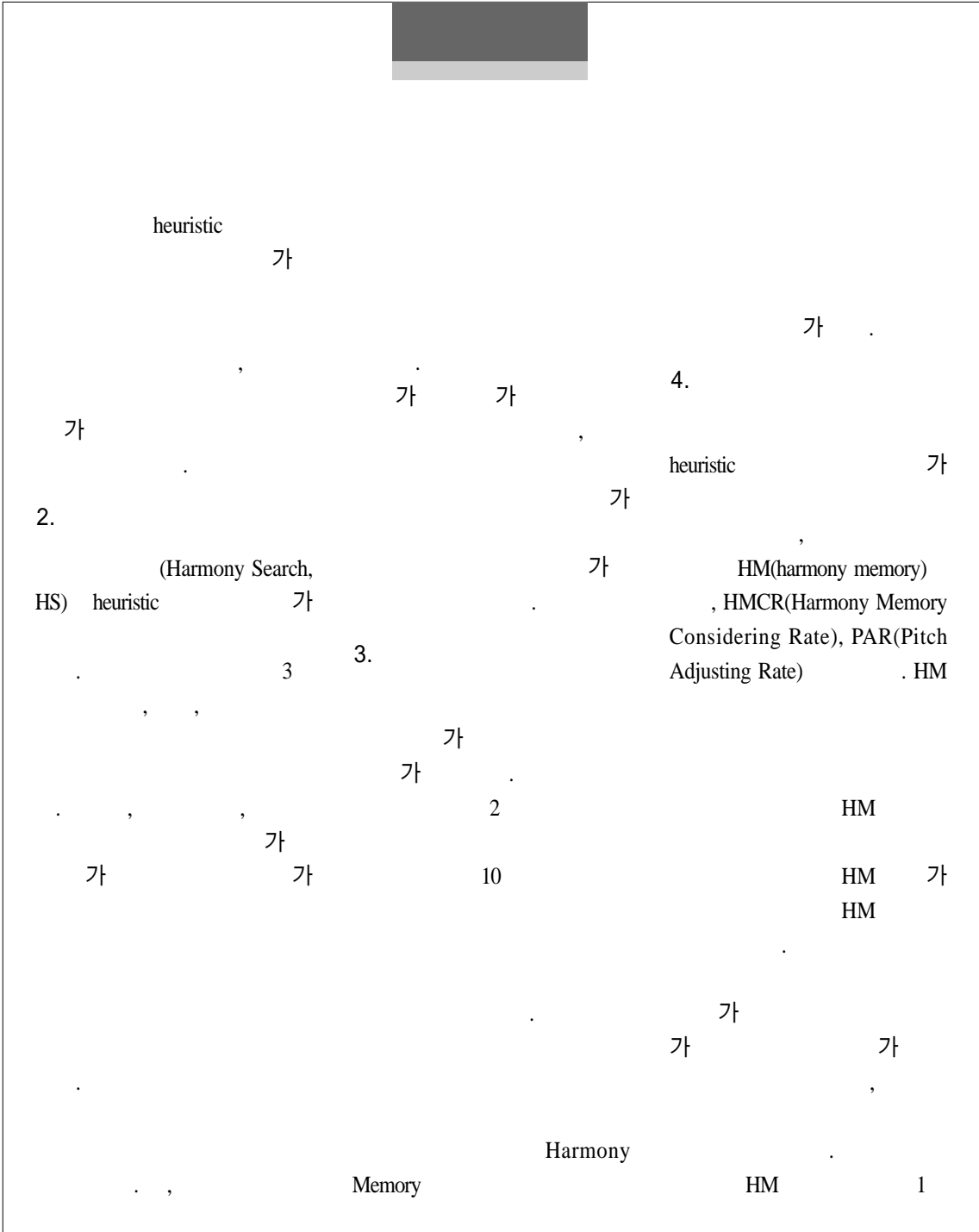
bikim@kict.re.kr

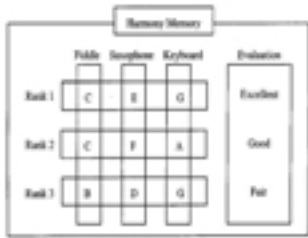
(Harmony Search, HS)

가
 가 가

가
 가 heuristic

가 (Local Optimum)
 (Global Optimum)





1. Harmony Memory

HMCR

HM

가

가

가

HMCR

가

가

PAR

(pitch)

5.

2000

가

가

가

(,)

가

가

가

가

: Zong-Woo Geem, Optimal Design of Water Distribution Networks using Harmony Search. Ph.D. dissertation, Korea University, 2000

jwmoon@kict.re.kr



1.

361 , 22,543

1985

가

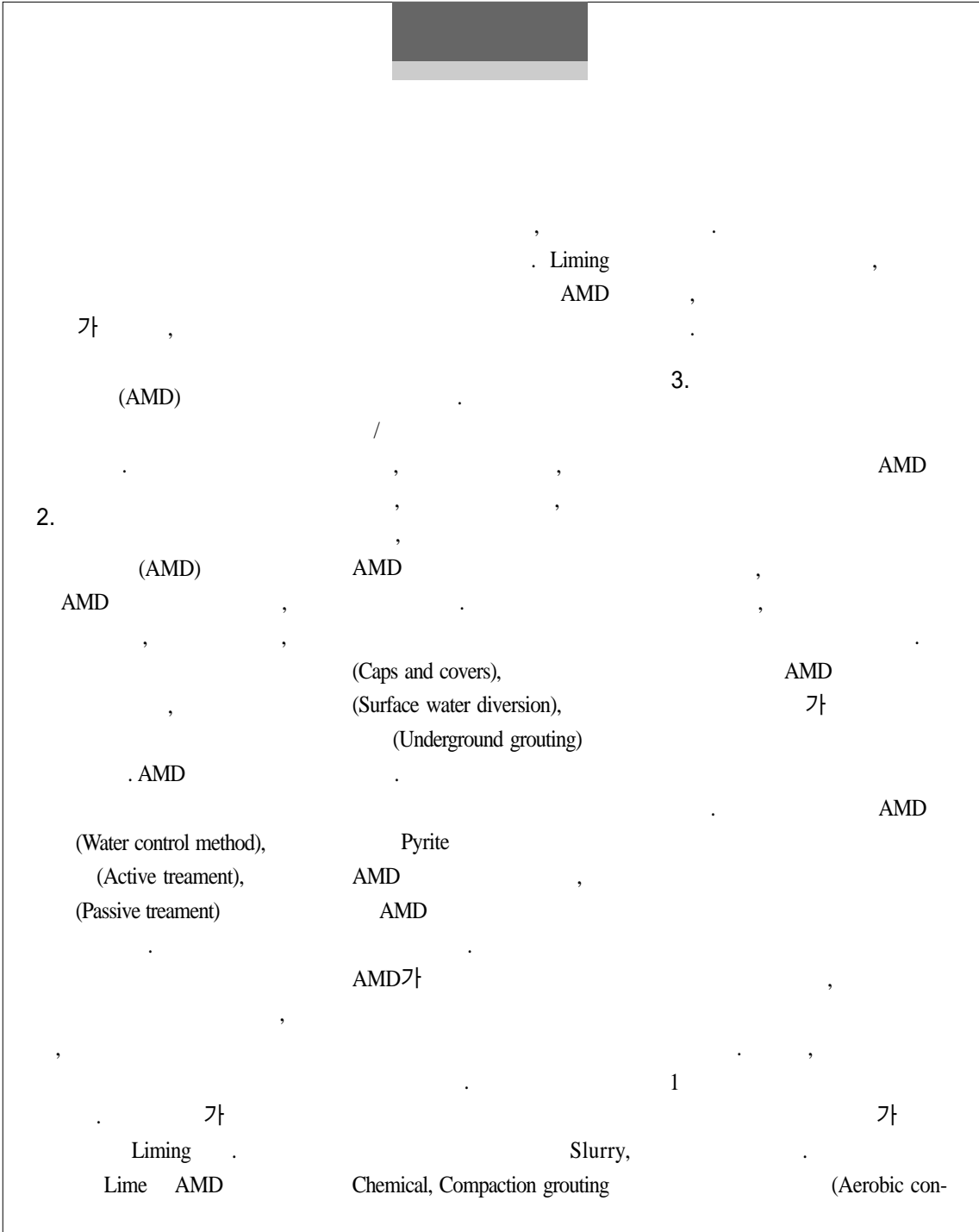
1989

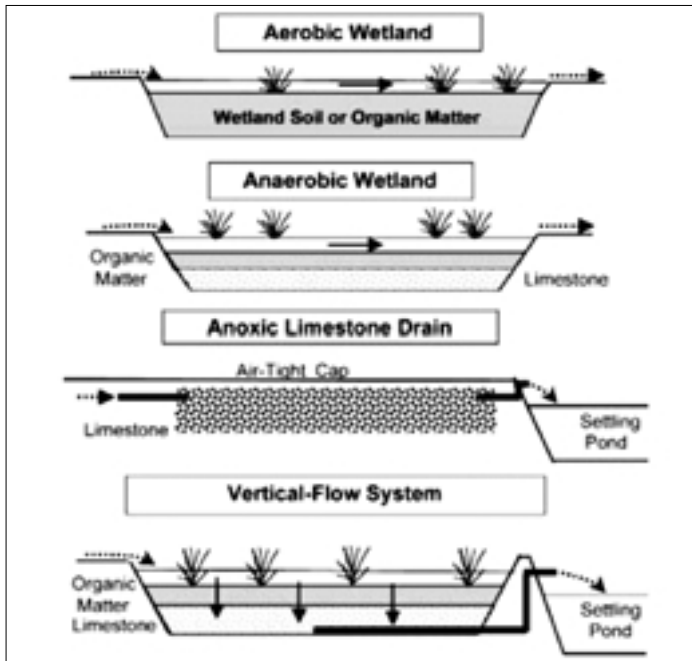
250

(AMD;

Acid mine drainage)가

가





1. (AMD; Acidic mine drainage)

constructed Wetlands)

metal sulfide,

negatively-

AMD

charged site

(Anoxic Limestone Drains, ALDs)
ALD limestone

AMD
Fe, Mn, Al

Limestone AMD

Metal hydroxide

constructed Wetlands)

8.0 가 hydroxide

Limestone

$Fe(OH)_2$

CH_2O

가
pH 6-9

, pH5

가
pH

가

Limestone

