

{RAND4.PAS}

Type

MATRIZ1 = Array[0..2,0..2] of Double;

VETOR3 = Array[1..50,0..5] of Double;

VETOR6 = Array[0..5] of Double;

Const

M1: Double = 4294967087.0;

M2: Double = 4294944443.0;

NORM: Double = 1.0 / (4294967087.0 + 1.0);

A12: Double = 1403580.0;

A13N: Double = 810728.0;

A21: Double = 527612.0;

A23N: Double = 1370589.0;

TWO17: Double = 131072.0;

TWO53: Double = 9007199254740992.0;

A1P127: MATRIZ1 = (

 ( 2427906178.0, 3580155704.0, 949770784.0),

 ( 226153695.0, 1230515664.0, 3580155704.0),

 ( 1988835001.0, 986791581.0, 1230515664.0)

 );

A2P127: MATRIZ1 = (

 ( 1464411153.0, 277697599.0, 1610723613.0 ),

 ( 32183930.0, 1464411153.0, 1022607788.0 ),

 ( 2824425944.0, 32183930.0, 2093834863.0 )

 );

Var

CG, BG, IG: VETOR3;

Semente: VETOR6;

SERIE: Integer;

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Function MULTMODM (A, S, C, M: Double): Double;

Var

 V: Double;

 A1: Longint;

Begin

 V := A \* S + C;

 If ((V >= TWO53) or (V <= -TWO53)) then

 Begin

 A1 := trunc(A / TWO17);

 A := A - (A1 \* TWO17);

 V := A1 \* S;

 A1 := trunc(V / M);

 V := V - (A1 \* M);

 V := V \* TWO17 + A \* S + C;

 End;

 A1 := trunc(V / M);

 V := V - (A1 \* M);

 If (V < 0.0) then MULTMODM := V + M else MULTMODM := V;

End;

{-----------------------------------------------------------------}

Procedure MATVECMODM (Var A: MATRIZ1; Var S: array of Double; Var V: Array of Double; M: Double);

Var

 I: Integer;

 X: Array[0..2] of Double;

 ZERO: Double;

Begin

 ZERO := 0.0;

 For I := 0 to 2 do

 Begin

 X[I] := MULTMODM (A[I][0], S[0], ZERO, M);

 X[I] := MULTMODM (A[I][1], S[1], X[I], M);

 X[I] := MULTMODM (A[I][2], S[2], X[I], M);

 End;

 For I := 0 to 2 do

 Begin

 V[I] := X[I];

 End;

End;

{---------------------------------------------------------------------}

Function RAND4 : Double;

Var

 K: Longint;

 P1, P2, U: Double;

Begin

 { Componente 1 }

 P1 := A12 \* CG[SERIE][1] - A13N \* CG[SERIE][0];

 K := trunc(P1/M1);

 P1 := P1 - (K \* M1);

 if (P1 < 0.0) then P1 := P1 + M1;

 CG[SERIE][0] := CG[SERIE][1];

 CG[SERIE][1] := CG[SERIE][2];

 CG[SERIE][2] := P1;

 { Componente 2 }

 P2 := A21 \* CG[SERIE][5] - A23N \* CG[SERIE][3];

 K := trunc(P2/M2);

 P2 := P2 - (K \* M2);

 if (P2 < 0.0) then P2 := P2 + M2;

 CG[SERIE][3] := CG[SERIE][4];

 CG[SERIE][4] := CG[SERIE][5];

 CG[SERIE][5] := P2;

 { Combinacao}

 if (P1 > P2) then U := (P1 - P2) \* NORM

 else U := (P1 - P2 + M1) \* NORM;

 RAND4 := U;

End;

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Procedure PASSASEMENTE;

Var

 I,J: Integer;

 TEMP: array[0..2] of Double;

Begin

 For I := 0 to 5 do

 Begin

 BG[1][I] := Semente[I];

 CG[1][I] := Semente[I];

 IG[1][I] := Semente[I];

 End;

 For J := 2 to 50 do

 Begin

 For I := 0 to 2 do

 Begin

 TEMP[I] := Semente[I];

 End;

 MATVECMODM (A1P127, TEMP, TEMP, M1);

 For I := 0 to 2 do

 Begin

 Semente[I] := TEMP[I];

 End;

 For I := 0 to 2 do

 Begin

 TEMP[I] := Semente[I + 3];

 End;

 MATVECMODM (A2P127, TEMP, TEMP, M2);

 For I := 0 to 2 do

 Begin

 Semente[I + 3] := TEMP[I];

 End;

 For I := 0 to 5 do

 Begin

 BG[J][I] := Semente[I];

 CG[J][I] := Semente[I];

 IG[J][I] := Semente[I];

 End;

 End;

 End;

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