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Component Elements Flow Prescription in Kalman Energy Gains Communication Systems Operation

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Abstract

This paper is aimed to develop a method of facing challenges when the state of mobile communication sets is liable to poor message reception. When the sets system and handling of their operation were orderly maintained, it was observed that successful message send-receive transitions depended on the conduciveness of the wave propagated communication media. On recalling Kalman energy gains analysis, an input-output communication model was proposed. Measurements taken of heat-wave restricted model enabled a gain of insight into the state of arts of the operating communication media and likely causes of send-receive failures.

Keywords: Communication elements profile, Optimum time varying track, Control quality orders, Interference and send-receive errors

1.0 Introduction

Efficient handling of mobile communication sets operation is often required, when users anticipate achievement of good send-receive message transfers [1]. At time t, let x-state input be initiated along track z(x, t), subject to control action u(x, t). In figure 1.1, a control matrix M and Kalman gains element $K= M[n, v]^T$ are selected to suppress the impact of remote and local noises [n, v] on the system performance [2]. Noisy instances are believed to be responsible for errors E_{x1}, E_z incurred and y(z, u) also believed to determine the extent of heat-wave restrictions stimulating the noises.

n v K

↓ ↓ ↓

t→ x→ (+)→ [z]→ (+)→ [u]→ (+)→ y

↑M E_{x1}, E_z → | ← k_n, k_v

|_____Feedback___|

Figure 1.1: Illustration of the system flow. Error correction is effected in the feedback loop.

Suppose y=y(z, u, t) and the sets system operation is y*-restricted, subject to heat diffusion and wave propagation problems [3], [4]

$$c_1\partial y/\partial t= \partial y/\partial (z, u),\ y(0, 0, t)= y_0,\ t > 0$$
$$c_2\partial^2 y/\partial t^2= \partial y/\partial (z, u),\ y(z, u, t_\infty)= y_1,\ z > 0,\ u > 0 \quad (1.1)$$

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Suppose x_1 is remote attribute, x_2 is inbuilt attribute and x_3 is user oriented attribute required. Let send that receives receive transfer intelligence be

$$F_v= (10z)^2 + u^2,\ z(t)=x_2 - x_1^2,\ u(t)= x_3 - x_1 \qquad (1.2)$$

Due to mismanagement and poor handling, noise motivated system error E is anticipated such that

$$E_s= du - dz/(2x_i);\ i=1, 2, 3 \qquad (1.3)$$

2.0 System Modeling

Suppose the time spent on completing the send-receive intelligence is

$$t_\infty= 2(k-\Delta t)/(2k-\Delta t)$$
$$= 1.31 \text{ radians } (=5\text{mins}),\ \Delta t/2=0.0655 \text{ radian } (=0.25\text{min}) \qquad (2.1)$$

Let any other time be

$$t= \Delta t/2 + k/t_\infty,\ k= 0, 1, 2\ . . . \qquad (2.2)$$

Then set of time dependent attributes x are given such that

$$x_1= 0.30984+ (t_\infty - t)^2/2$$
$$x_2= 0.17223 + (t_\infty - t)/((k+1)t_\infty)$$
$$x_3= 0.17223 - (t_\infty - t)^2/2 \qquad (2.3)$$

Noting equations (1.1)-(1.3),

$$z= (t_\infty - t)[0.30984(t_\infty - t)^2 + (t_\infty - t)^3/4 - ((k+1)t_\infty)^{-1}] - 0.0762292$$
$$u= -0.13761 - (t_\infty - t)^2$$
$$E_s= 2(t_\infty - t) + [(k+1)t_\infty((t_\infty -t)^2 + 0.61968)]^{-1} -1 \qquad (2.4)$$

3.0 Application of Results

Denote solutions to equation (1.1) by y_h in respect of heat and by y_w in respect of wave. Then there is solution ratio

$$y= y_h / y_w = ((\sin t + \cos t)e^t)^{-1} \qquad (3.1)$$

Subjecting F_v to minimization procedure [5] yielded the values in table 3.1

Table 3.1: Calculated sample values

k	t	x_1	x_2	x_3	F_v	y
0	0.000	1.16789	1.17223	-0.68582	1.057350	1.0000
1	0.131	0.45325	0.35087	-0.00718	1.037250	0.8752
2	0.262	0.54872	0.38155	0.41336	0.675310	0.7660
3	0.393	1.16660	-1.39239	-0.00229	0.103242	0.6704
4	0.524	2.21762	-2.17799	-1.03604	0.092343	0.5868
5	0.655	3.84000	-2.70547	-2.65817	0.092341	0.5136
.	. . . . .	. . . .	. . . .	. . . .	. . . .	. . . .

It is pertinent to adopt n-motivated induced error

$$E_{x1}= x_1/E_S \quad (3.2)$$

and v-motivated induced error

$$E_z= z/E_s \quad (3.3)$$

Consequently, values in table 3.1 were used to obtain the ones in table 3.2.

Table 3.2: Calculated sample values

k	t	z	u	E_{x1}	E_z	E_S
0	0.000	-0.19174	-1.85371	2.31809	0.2886662	0.5038152
1	0.131	0.14543	-0.46043	1.84597	0.5923171	0.2455347
2	0.262	0.08046	-0.13536	-0.40659	-0.0596167	-1.3495614
3	0.393	-2.75335	-1.16889	-0.40050	0.9452343	-2.9128709
4	0.524	-7.09583	-3.25366	-0.48683	1.5577491	-4.5557807
5	0.655	-17.4571	-6.49817	-0.63931	2.9063826	-6.0064597
.	. . . . .	. . . .	. . . .	. . . .	. . . .	. . . .

Choose M to be reduced Hessian of F_v such that

$$M= \nabla^2 F_v/200$$

$$= \begin{bmatrix} 1 & 0 \\ 0 & 0.01 \end{bmatrix} \quad (3.4)$$

Then the characteristic values of M are [1, 0.01] while the corresponding characteristic vectors are n=[1, 0] and v= [0, 0.01]. These values yielded the kalman gains [6], [7]

$$K= M[n, v]^T$$
$$= [k_n, k_v]$$
$$= [1, 0.01] \quad (3.5)$$

4.0 Conclusion

Component wise, $[E_{x1}, E_z]$ consists of remote and local errors corresponding to [n, v]. As these errors continue to weigh down the system performance, the component kalman gains $[k_n, k_v]$ obtained suppress the adverse effects of the heat-wave restrictions as shown in the feedback loop of figure 1.1 to cause values of y to progressively diminish as reflected in table 3.1.

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