The Outage Probability and Fade Duration of the SSC Combiner Output Signal in the Presence of Log-normal fading

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Abstract: - Level crossing rate, outage probability and average time of fade duration of the SSC combiner output signal are determined in this paper. The presence of log-normal fading at the input is observed. The results are shown graphically for different variance values, decision threshold values and fading parameters.

Key-Words: - Diversity reception, Fade Duration, Level Crossing Rate, Log-normal fading, Outage Probability, SSC Combining

1 Introduction

The wireless communication systems use some form of diversity combining techniques to reduce multupath fading appeared in the channel. Among the simpler diversity combining schemes the two most popular are selection combining (SC) and switch and stay combining (SSC). The receiver selects a particular antenna until its quality drops below a predetermined threshold. When this happens, the receiver switches to another antenna and stays with it for the next time slot, regardless of whether or not the channel quality of that antenna is above or below the predetermined threshold.

In the paper [1] Alouini and Simon develop, analyze and optimize a simple form of dual-branch switch and stay combining (SSC). The consideration of SSC systems in the literature has been restricted to low-complexity where the number of diversity antennas usually limited to two ([2], [3] and [4]). In [5] the moment generating function (MGF) of the signal power at the output of dual-branch switch-and-stay selection diversity (SSC) combiners is derived. The level crossing rate, outage probability and fade duration of the SSC combiner output signal in the presence of Nakagami *–m* fading are determined in [6].

In this paper the llevel crossing rate, outage probability and fade duration of the SSC combiner output signal in the presence of log-normal fading at the input will be observed. The results will be shown graphically for different parameters values.

2 System Model

The model of the SSC combiner with two inputs, considered in this paper, is shown in Fig. 1. The signals at the combiner input are r_1 and r_2, and r is the combiner output signal. The predetection combining is observed.

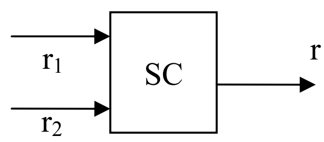

Fig. 1: Model of the SSC combiner with two inputs

The probability of the event that the combiner first examines the signal at the first input is P_1, and for the second input is P_2. If the combiner examines first the signal at the first input and if the value of the signal at the first input is above the treshold, r_T, SSC combiner forwards this signal to the circuit for the decision. If the value of the signal at the first input is below the treshold r_T, SSC combiner forwards the signal from the other input to the circuit for the decision.

If the SSC combiner first examines the signal from the second combiner input it works in the similar way.

The determination of the probability density of the combiner output signal is important for the receiver performances determination. The probability for the first input to be examined first is P_1 and for the second input to be examined first is P_2.

3 System Performances

The probability density functions (PDFs) of the combiner input signals, r_1 and r_2, in the presence of log-normal fading, are:

$$p_{r_1}(r_1) = \frac{1}{\sqrt{2\pi}\sigma_1 r_1} e^{-\frac{(\ln r_1 - \mu_1)^2}{2\sigma_1^2}} \qquad r_1 \geq 0 \quad (1)$$

$$p_{r_2}(r_2) = \frac{1}{\sqrt{2\pi}\sigma_2 r_2} e^{-\frac{(\ln r_2 - \mu_2)^2}{2\sigma_2^2}} \qquad r_2 \geq 0 \quad (2)$$

The cumulative probability densities (CDFs) are given by:

$$F_{r_1}(r_T) = \int_0^{r_T} p_{r_1}(x)\,dx \quad (3)$$

$$F_{r_2}(r_T) = \int_0^{r_T} p_{r_2}(x)\,dx \quad (4)$$

r_T is the treshold of the decision. In the presence of log-normal fading CDFs are:

$$F_{r_1}(r_T) = \int_0^{r_T} \frac{1}{\sqrt{2\pi}\sigma_1 x} e^{-\frac{(\ln x - \mu_1)^2}{2\sigma_1^2}} dx = \frac{1}{2} + \frac{1}{2} erf\left(\frac{\ln r_t - \mu_1}{\sigma_1\sqrt{2}}\right) \quad (5)$$

$$F_{r_2}(r_T) = \int_0^{r_T} \frac{1}{\sqrt{2\pi}\sigma_2 x} e^{-\frac{(\ln x - \mu_2)^2}{2\sigma_2^2}} dx = \frac{1}{2} + \frac{1}{2} erf\left(\frac{\ln r_t - \mu_2}{\sigma_2\sqrt{2}}\right) \quad (6)$$

where *erfc(x)* is the error function and it is defined as [7]:

$$erf(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

The joint probability densities of the combiner input signals, r_1 and r_2, and their derivatives $\dot{r}_1$ and $\dot{r}_2$, in the presence of log-normal fading, are:

$$p_{r_1\dot{r}_1}(r_1, \dot{r}_1) = \frac{1}{\sqrt{2\pi}\sigma_1 r_1} e^{-\frac{(\ln r_1 - \mu_1)^2}{2\sigma_1^2}} \cdot \frac{1}{\sqrt{2\pi}\beta_1 r_1} e^{-\frac{\dot{r}_1^2}{2\beta_1^2 r_1^2}} \qquad r_1 \geq 0 \quad (7)$$

$$p_{r_2\dot{r}_2}(r_2, \dot{r}_2) = \frac{1}{\sqrt{2\pi}\sigma_2 r_2} e^{-\frac{(\ln r_2 - \mu_2)^2}{2\sigma_2^2}} \cdot \frac{1}{\sqrt{2\pi}\beta_2 r_2} e^{-\frac{\dot{r}_2^2}{2\beta_2^2 r_2^2}} \qquad r_2 \geq 0 \quad (8)$$

The probabilities P_1 and P_2 are:

$$P_1 = \frac{F_{r_2}(r_T)}{F_{r_1}(r_T) + F_{r_2}(r_T)} = \frac{1 + erf\left(\frac{\ln r_t - \mu_2}{\sigma_2\sqrt{2}}\right)}{2 + erf\left(\frac{\ln r_t - \mu_1}{\sigma_1\sqrt{2}}\right) + erf\left(\frac{\ln r_t - \mu_2}{\sigma_2\sqrt{2}}\right)} \quad (9)$$

$$P_2 = \frac{F_{r_1}(r_T)}{F_{r_1}(r_T) + F_{r_2}(r_T)} = \frac{1 + erf\left(\frac{\ln r_t - \mu_1}{\sigma_1\sqrt{2}}\right)}{2 + erf\left(\frac{\ln r_t - \mu_1}{\sigma_1\sqrt{2}}\right) + erf\left(\frac{\ln r_t - \mu_2}{\sigma_2\sqrt{2}}\right)} \quad (10)$$

The expression for the joint probability density function of the SSC combiner output signal and its derivative will be determined first for the case: $r < r_T$:

$$p_{r\dot{r}}(r\dot{r}) = P_1 \cdot F_{r_1}(r_T) \cdot p_{r_2\dot{r}_2}(r\dot{r}) + P_2 \cdot F_{r_2}(r_T) \cdot p_{r_1\dot{r}_1}(r\dot{r}) \quad (11)$$

and then for $r \geq r_T$:

$$p_{r\dot{r}}(r\dot{r}) = P_1 \cdot p_{r_1\dot{r}_1}(r\dot{r}) + P_1 \cdot F_{r_1}(r_T) \cdot p_{r_2\dot{r}_2}(r\dot{r}) + P_2 \cdot p_{r_2\dot{r}_2}(r\dot{r}) + P_2 \cdot F_{r_2}(r_T) \cdot p_{r_1\dot{r}_1}(r\dot{r}) \quad (12)$$

We have now the case $r < r_T$:

$$p_{r\dot{r}}(r\dot{r}) = \frac{1 + erf\left(\frac{\ln r_t - \mu_2}{\sigma_2\sqrt{2}}\right)}{2 + erf\left(\frac{\ln r_t - \mu_1}{\sigma_1\sqrt{2}}\right) + erf\left(\frac{\ln r_t - \mu_2}{\sigma_2\sqrt{2}}\right)} \cdot \left(\frac{1}{2} + \frac{1}{2} erf\left(\frac{\ln r_t - \mu_1}{\sigma_1\sqrt{2}}\right)\right) \frac{1}{\sqrt{2\pi}\sigma_2 r} e^{-\frac{(\ln r - \mu_2)^2}{2\sigma_2^2}} \frac{1}{\sqrt{2\pi}\beta_2 r} e^{-\frac{\dot{r}^2}{2\beta_2^2 r^2}} + \frac{1 + erf\left(\frac{\ln r_t - \mu_1}{\sigma_1\sqrt{2}}\right)}{2 + erf\left(\frac{\ln r_t - \mu_1}{\sigma_1\sqrt{2}}\right) + erf\left(\frac{\ln r_t - \mu_2}{\sigma_2\sqrt{2}}\right)} \cdot$$

$$\cdot\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)\right)\frac{1}{\sqrt{2\pi}\sigma_1 r}e^{-\frac{(\ln r-\mu_1)^2}{2\sigma_1^2}}\cdot$$

$$\cdot\frac{1}{\sqrt{2\pi}\,\beta_1 r}e^{-\frac{\dot{r}^2}{2\beta_1^2 r^2}} \tag{13}$$

and for $r \ge r_T$:

$$p_{r\dot{r}}(r\dot{r})=\frac{1+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\frac{1}{\sqrt{2\pi}\sigma_1 r}e^{-\frac{(\ln r-\mu_1)^2}{2\sigma_1^2}}\cdot\frac{1}{\sqrt{2\pi}\,\beta_1 r}e^{-\frac{\dot{r}^2}{2\beta_1^2 r^2}}+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)\right)\frac{1}{\sqrt{2\pi}\sigma_2 r}e^{-\frac{(\ln r-\mu_2)^2}{2\sigma_2^2}}\frac{1}{\sqrt{2\pi}\,\beta_2 r}e^{-\frac{\dot{r}^2}{2\beta_2^2 r^2}}+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\frac{1}{\sqrt{2\pi}\sigma_2 r}e^{-\frac{(\ln r-\mu_2)^2}{2\sigma_2^2}}\frac{1}{\sqrt{2\pi}\,\beta_2 r}e^{-\frac{\dot{r}^2}{2\beta_2^2 r^2}}+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)\right)\cdot$$

$$\cdot\frac{1}{\sqrt{2\pi}\sigma_1 r}e^{-\frac{(\ln r-\mu_1)^2}{2\sigma_1^2}}\frac{1}{\sqrt{2\pi}\,\beta_1 r}e^{-\frac{\dot{r}^2}{2\beta_1^2 r^2}} \tag{14}$$

For the channels with identical parameters it is, for $r < r_T$:

$$p_{r\dot{r}}(r\dot{r})=\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu}{\sigma\sqrt{2}}\right)\right)\cdot\frac{1}{\sqrt{2\pi}\sigma r}e^{-\frac{(\ln r-\mu)^2}{2\sigma^2}}\cdot$$

$$\cdot\frac{1}{\sqrt{2\pi}\,\beta r}e^{-\frac{\dot{r}^2}{2\beta^2 r^2}} \tag{15}$$

and for $r \ge r_T$:

$$p_{r\dot{r}}(r\dot{r})=\left(\frac{3}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu}{\sigma\sqrt{2}}\right)\right)\cdot\frac{1}{\sqrt{2\pi}\sigma r}e^{-\frac{(\ln r-\mu)^2}{2\sigma^2}}\cdot$$

$$\cdot\frac{1}{\sqrt{2\pi}\,\beta r}e^{-\frac{\dot{r}^2}{2\beta^2 r^2}} \tag{16}$$

The level crossing rate is:

$$N(r_{th})=\int_0^\infty \dot{r}\,p_{r\dot{r}}(r_{th},\dot{r})\,d\dot{r} \tag{17}$$

For the channels with identical parameters it is valid for $r_{th} < r_T$:

$$N(r_{th})=\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu}{\sigma\sqrt{2}}\right)\right)\cdot$$

$$\cdot\frac{1}{\sqrt{2\pi}\sigma r_{th}}e^{-\frac{(\ln r_{th}-\mu)^2}{2\sigma^2}}\cdot\frac{\beta r_{th}}{\sqrt{2\pi}} \tag{18}$$

And for $r_{th} \ge r_T$:

$$N(r_{th})=\left(\frac{3}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu}{\sigma\sqrt{2}}\right)\right)\cdot$$

$$\cdot\frac{1}{\sqrt{2\pi}\sigma r_{th}}e^{-\frac{(\ln r_{th}-\mu)^2}{2\sigma^2}}\cdot\frac{\beta r_{th}}{\sqrt{2\pi}} \tag{19}$$

The outage probabilty $P_{out}(r_{th})$ is defined as:

$$P_{out}(r_{th})=\int_0^{r_{th}} p_r(r)dr \tag{20}$$

For $r < r_T$ probability density function is:

$$p_r(r)=P_1\cdot F_{r_1}(r_T)\cdot p_{r_2}(r)+P_2\cdot F_{r_2}(r_T)\cdot p_{r_1}(r) \tag{21}$$

for $r \ge r_T$

$$p_r(r)=P_1\cdot p_{r_1}(r)+P_1\cdot F_{r_1}(r_T)\cdot p_{r_2}(r)+$$

$$+P_2\cdot p_{r_2}(r)+P_2\cdot F_{r_2}(r_T)\cdot p_{r_1}(r) \tag{22}$$

In the presence of log-normal fading and for $r < r_T$ the probability density function is:

$$p_r(r)=\frac{1+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)\right)\frac{1}{\sqrt{2\pi}\sigma_2 r}e^{-\frac{(\ln r-\mu_2)^2}{2\sigma_2^2}}+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)\right)\frac{1}{\sqrt{2\pi}\sigma_1 r}e^{-\frac{(\ln r-\mu_1)^2}{2\sigma_1^2}} \quad (23)$$

for $r \geq r_T$:

$$p_r(r)=\frac{1+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\frac{1}{\sqrt{2\pi}\sigma_1 r}e^{-\frac{(\ln r-\mu_1)^2}{2\sigma_1^2}}+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)\right)\frac{1}{\sqrt{2\pi}\sigma_2 r}e^{-\frac{(\ln r-\mu_2)^2}{2\sigma_2^2}}+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\frac{1}{\sqrt{2\pi}\sigma_2 r}e^{-\frac{(\ln r-\mu_2)^2}{2\sigma_2^2}}+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)\right)\frac{1}{\sqrt{2\pi}\sigma_1 r}e^{-\frac{(\ln r-\mu_1)^2}{2\sigma_1^2}} \quad (24)$$

The outage probabilties $P_{out}(r_{th})$, for $r_{th} < r_T$, are defined as:

$$P_{out}(r_{th})=\frac{1+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)\right)\left(\frac{1}{2}+erf\left(\frac{\ln r_{th}-\mu_2}{\sigma_2\sqrt{2}}\right)\right)+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)\right)\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_{th}-\mu_1}{\sigma_1\sqrt{2}}\right)\right)$$

(25)

for $r_{th} \geq r_T$:

$$P_{out}(r_{th})=\frac{1+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}erf\left(\frac{\ln r_{th}-\mu_1}{\sigma_1\sqrt{2}}\right)-\frac{1}{2}erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)\right)+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)\right)\left(\frac{1}{2}+erf\left(\frac{\ln r_{th}-\mu_2}{\sigma_2\sqrt{2}}\right)\right)+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}erf\left(\frac{\ln r_{th}-\mu_2}{\sigma_2\sqrt{2}}\right)-\frac{1}{2}erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)\right)+$$

$$+\frac{1+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)}{2+erf\left(\frac{\ln r_t-\mu_1}{\sigma_1\sqrt{2}}\right)+erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)}\cdot$$

$$\cdot\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_t-\mu_2}{\sigma_2\sqrt{2}}\right)\right)\left(\frac{1}{2}+\frac{1}{2}erf\left(\frac{\ln r_{th}-\mu_1}{\sigma_1\sqrt{2}}\right)\right) \tag{26}$$

4 Numerical Results

The joint probability density function (PDF) of the SSC combiner output signal is shown in Fig. 2 for some values of r_T, σ, μ and β. The level crossing rate curve $N(r_{th})$, for some parameters is given in Figs. 3. Fade duration curves $T(r_{th})$ are shown in Figs. 4. to 7. for different parameter values.

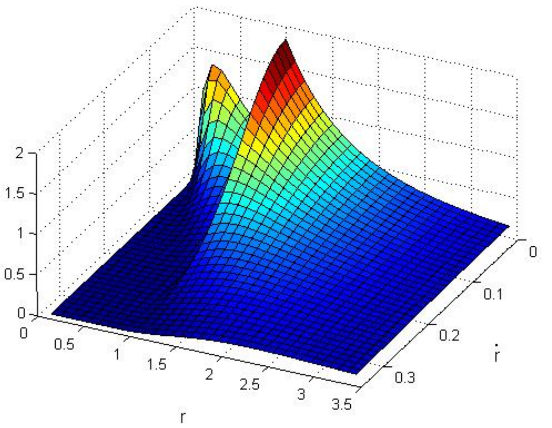

Fig. 2. The PDF of the SSC combiner output signal and its derivative $p_{r\dot{r}}(r,\dot{r})$ for r_T =1, σ=1, μ=0.5 and β=0. 1

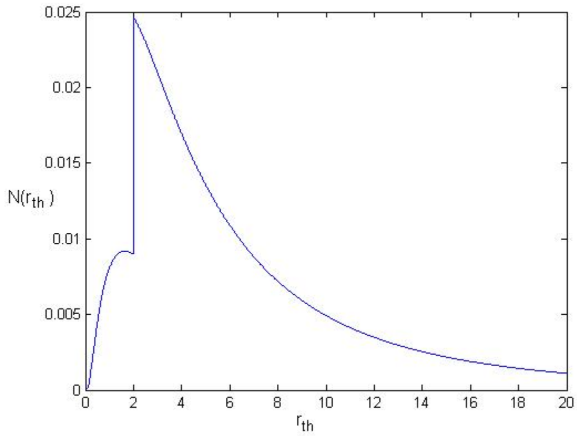

Fig. 3. Level crossing rate $N(r_{th})$ for $r_t = 2, \sigma = 1, \mu = 0.5, \beta = 0.1$

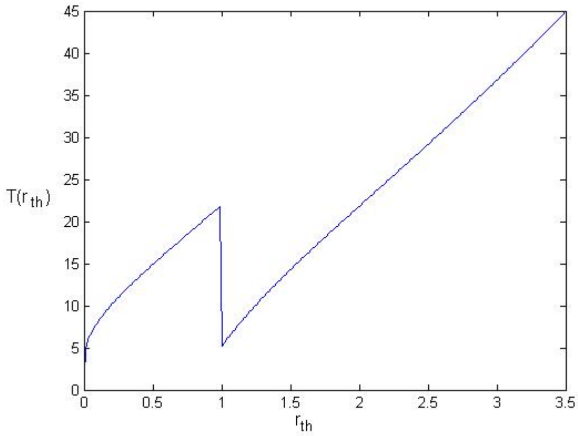

Fig. 4. Fade duration $T(r_{th})$ for $r_t = 1, \sigma = 1, \mu = 0.5, \beta = 0.1$

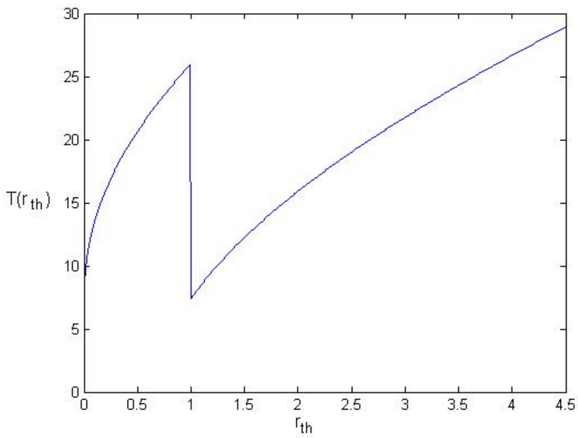

Fig. 5. Fade duration $T(r_{th})$ for $r_t = 1, \sigma = 2, \mu = 0.5, \beta = 0.2$

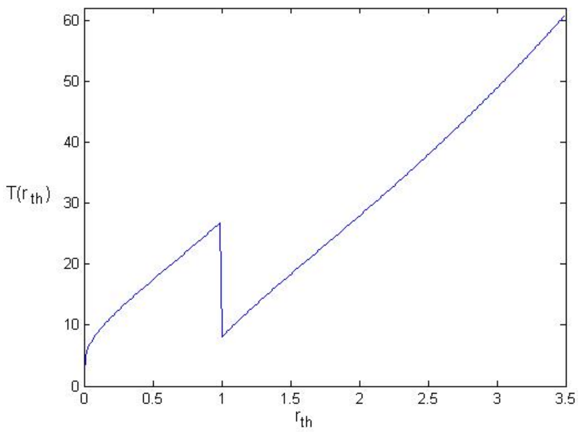

Fig. 6. Fade duration $T(r_{th})$ for $r_t = 1, \sigma = 1, \mu = 0.2, \beta = 0.1$

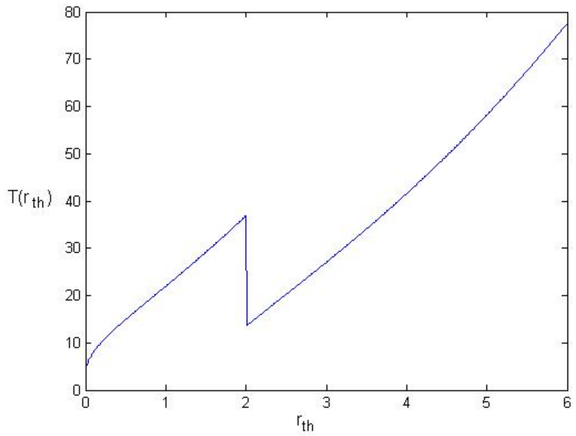

Fig. 7. Fade duration $T(r_{th})$ for $r_t = 2, \sigma = 1, \mu = 0.5, \beta = 0.1$

5 Conclusion

In this paper the level crossing rate, outage probability and fade duration of the SSC combiner output signal are determined in the presence of log-normal fading. The results are shown graphically for different variance values, decision threshold values and parameters values.

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