1. INTRODUCTION

The digital mixer is realizable but has spurs. Careful filtering is needed.

\[ f_1 \rightarrow [f_1-f_2]+s \rightarrow [f_1-f_2]+s \]

Digital mixer:
- Use digital circuits (digital gates)
- Digital signals

2. MIXER DESIGN

- Analogue mixer can be expressed
  - Replace analogue signal by digital
  - Multiplication is XOR
  - Implement addition
  - Implement phase shift - (using Dflip

**Addition**

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<tr>
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<th>A</th>
<th>B</th>
<th>A+B</th>
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<tbody>
<tr>
<td>-1</td>
<td>-1</td>
<td>-2</td>
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<tr>
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<tr>
<td>1</td>
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<tr>
<td>1</td>
<td>1</td>
<td>+2</td>
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- A and B are two level signal while A+B are three level signal.
- The first line is low level and is neither A NOR B, while the last one is high level and can be implemented as AND.
- The output of the first line and last line will be input of RS trigger.

3. SIMULATION

Figure 1: Functional diagram of the proposed mixer

Figure 2. Digital mixer with digital logic

4. IMPLEMENTATION AND MEASUREMENT

D flip flop CD74HC74E, NOT gate CD74HC04E, XOR gate CD74HC86E, NOR gate CD74HC02E, AND gate CD74HC08E, PLL chip CD74HC4046AE

CONCLUSION

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REFERENCES