Part 5: Acquisition

Building a GPS receiver from scratch

Chris Doble

Topics

1. Parameters
   - PRN code phase
   - Carrier wave frequency shift
2. Finding parameters
3. Parameter space
4. Determining presence

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- To decode satellite i's navigation message bit, calculate

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- In order to align them, we need to know the phase

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- Undo the rotation by multiplying each sample by $e^{-j2\pi\Delta ft}$
- This is called carrier wipeoff and it's why we need to know Δf

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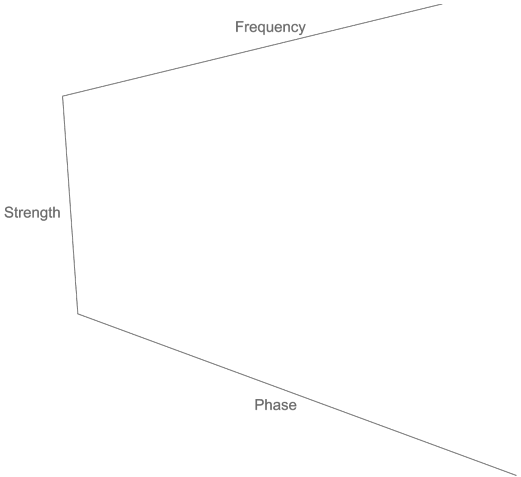
Finding parameters



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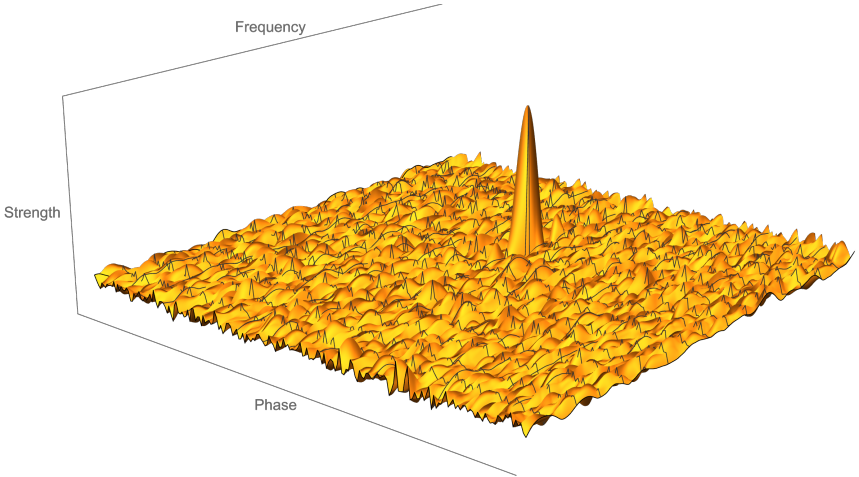

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- This is called non-coherent integration

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- There are 2046 phases to check

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- $\Delta t_{\text{total}} \approx \pm 7.5\,\text{kHz}$

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5. Periodically try to acquire satellites we're not tracking

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  3. If above the threshold $\Rightarrow$ present
  4. If below the threshold $\Rightarrow$ absent, check again later