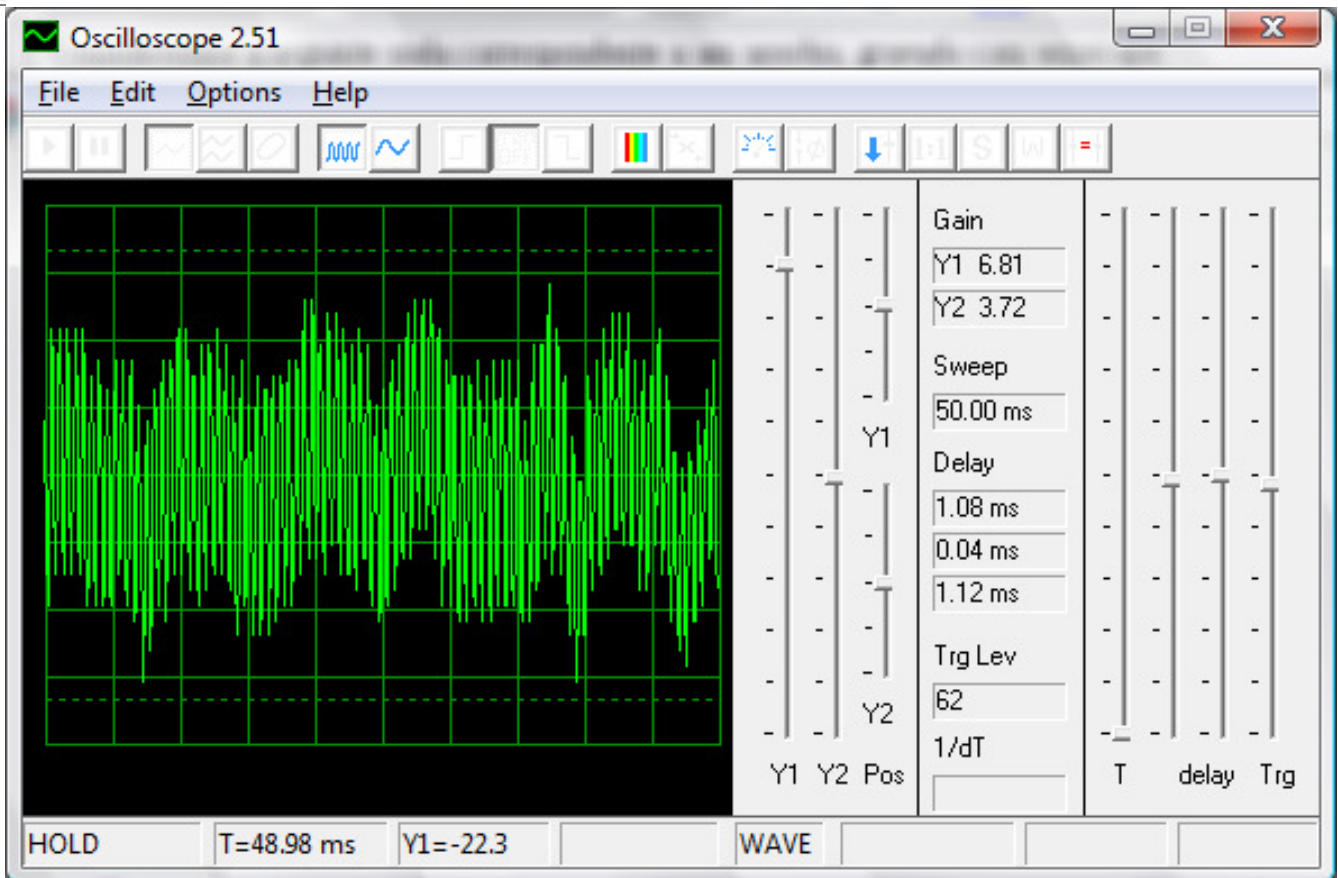


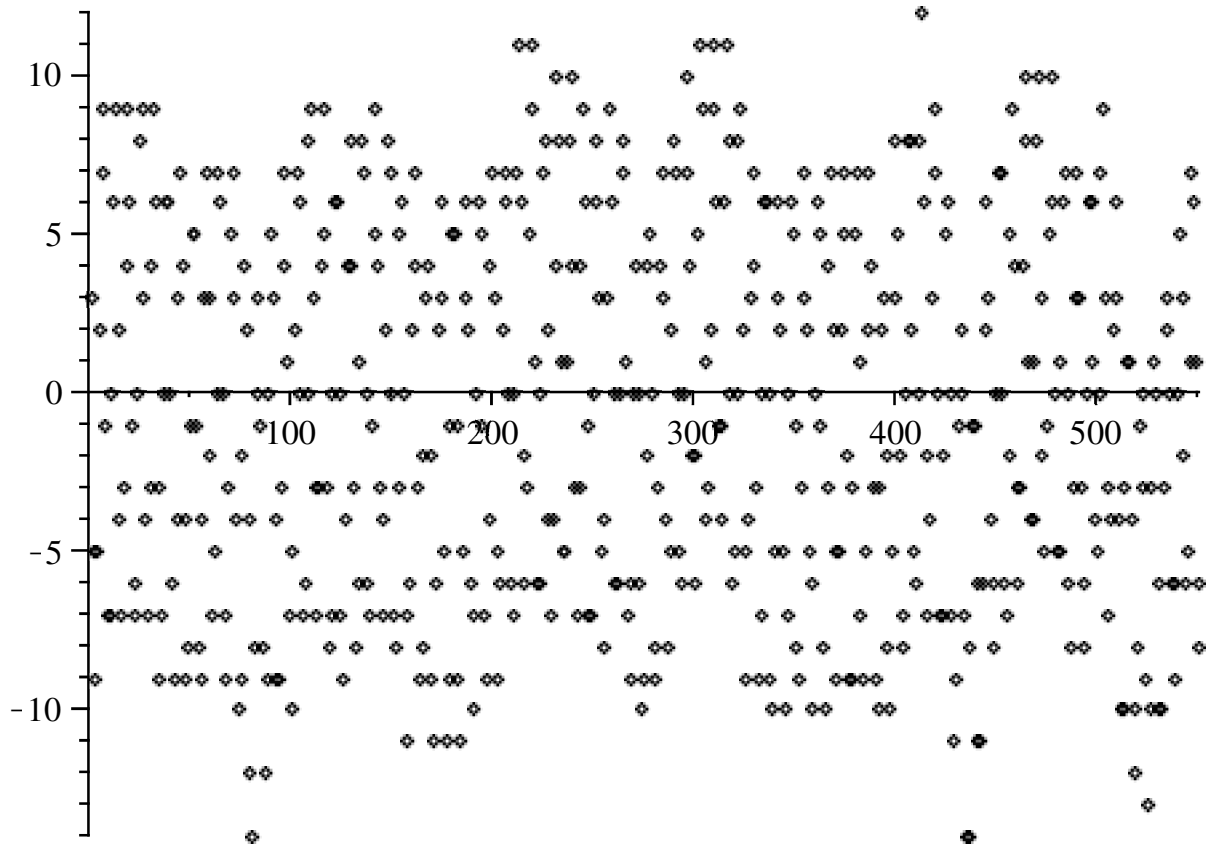
Análise de Sinais com FFT

Consideremos a seguinte onda correspondente a um assobio, gravado com winscope:



Os dados correspondentes a esta onda foram exportados e importados no Maple:

```
> readlib(readdata):  
> readdata(`D:/2008a/cdi4/whistle.txt`,2):  
> L:=%:  
> with(plots):  
> pointplot(L);
```



```
> nops(L); n:=551:
```

551

(1)

```
> Z:= [seq(L[i][2], i=1..n)]:
```

```
> Z:=convert(Z, Vector);
```

$$Z := \left[\begin{array}{l} 1 \dots 551 \text{ Vector}_{\text{column}} \\ \text{Data Type: anything} \\ \text{Storage: rectangular} \\ \text{Order: Fortran_order} \end{array} \right]$$

(2)

```
>
```

```
> with(DiscreteTransforms):
```

```
> Z3:= FourierTransform(Z)*sqrt(n);
```

$$Z3 := \left[\begin{array}{l} 1 \dots 551 \text{ Vector}_{\text{column}} \\ \text{Data Type: anything} \\ \text{Storage: rectangular} \\ \text{Order: Fortran_order} \end{array} \right]$$

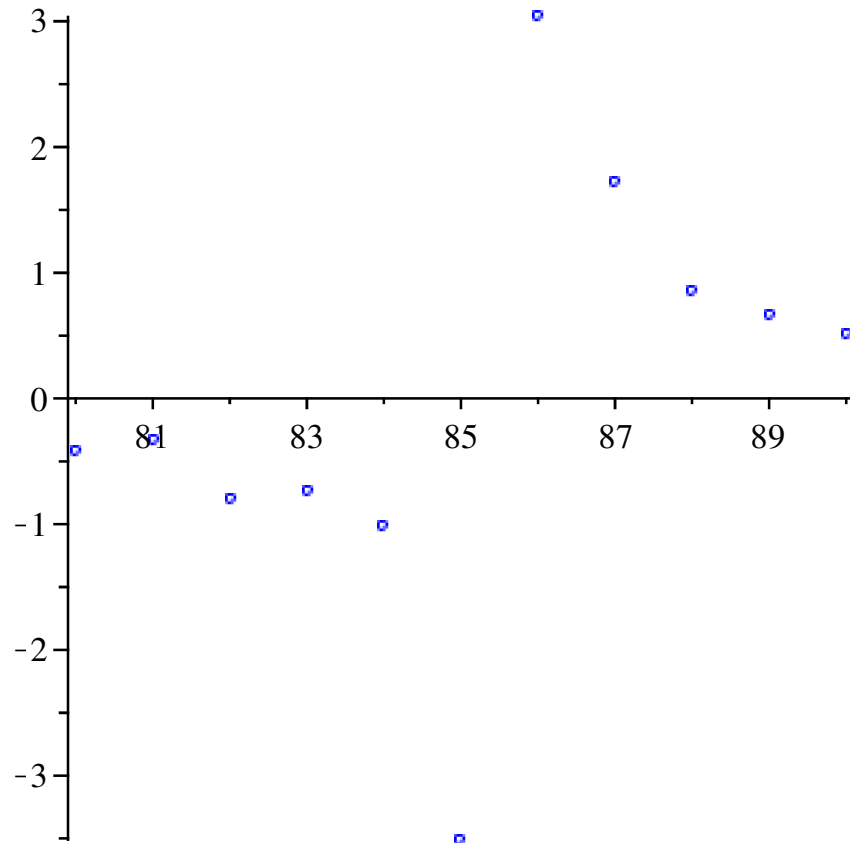
(3)

```
> L_re:= [seq([i, (2/n)*Re(Z3[i+1])], i=80..90)]:
```

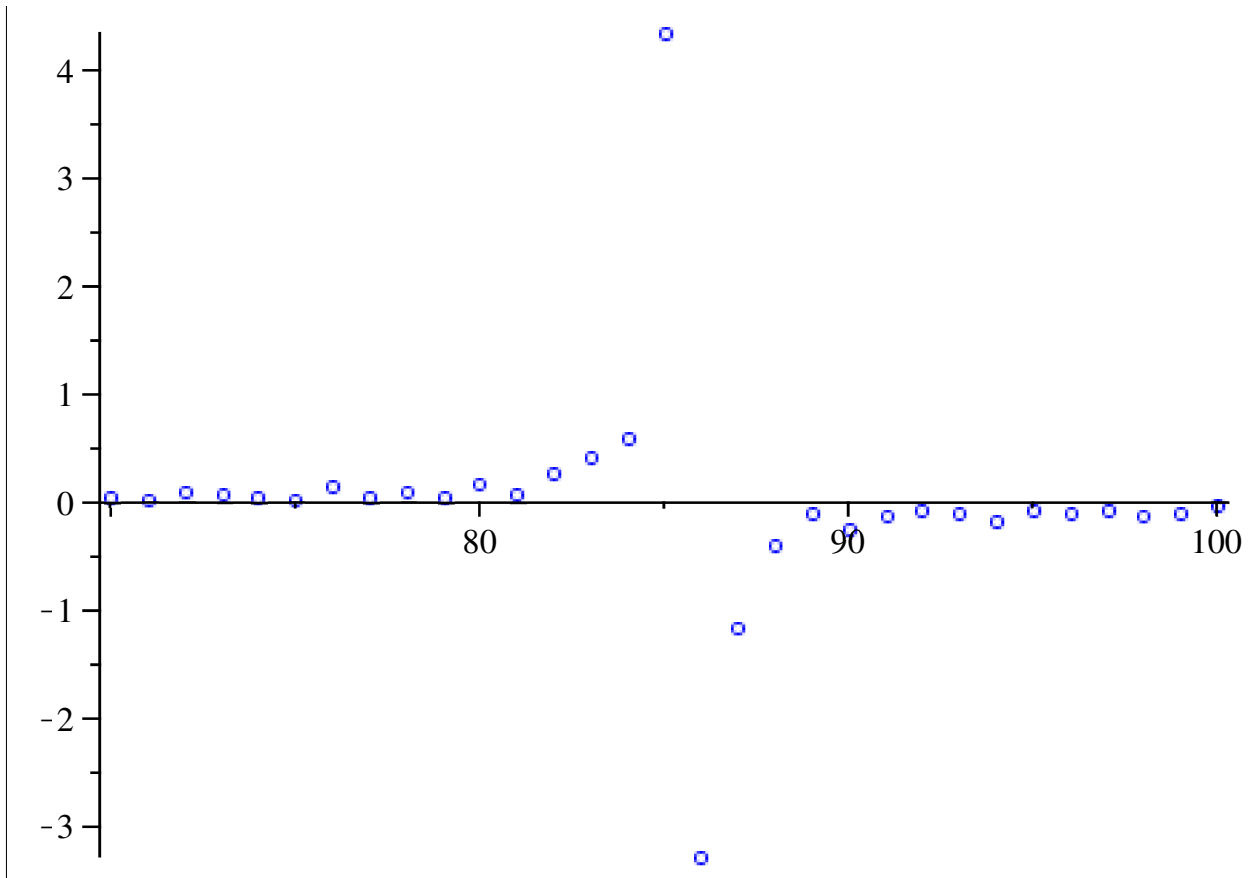
```
> L_im:= [seq([i, (2/n)*Im(Z3[i+1])], i=70..100)]:
```

```
> with(plots):
```

```
> pointplot(L_re, color=blue, symbol=circle);
```



```
> pointplot(L_im, color=blue, symbol=circle);
```



Notamos que por volta de $n = 85$ e $n=86$ temos uma frequência dominante. Como o intervalo correspondente aos pontos é de 50 ms, a frequência dominante é aproximadamente (Hz)

```
> 85/0.05;
```

```
1700.000000
```

(4)

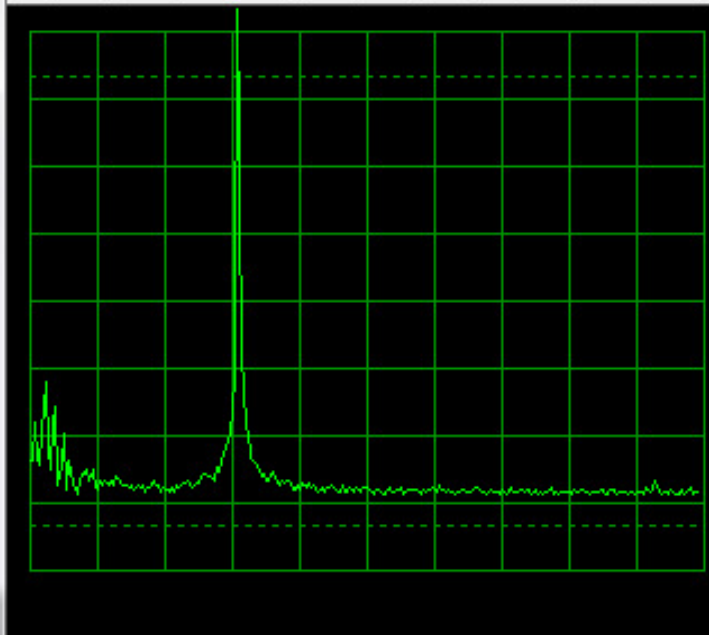
```
>
```

De fato a análise FFT do winscope dá aproximadamente o mesmo resultado:

```
[
```

Oscilloscope 2.51

File Edit Options Help



| | | | | | |
|---------|-----------|-----|---|-------|-----|
| Gain | | | | | |
| Y1 | 6.81 | | | | |
| Y2 | 3.72 | | | | |
| Sweep | 5512.5 Hz | | | | |
| Delay | 1.08 ms | | | | |
| | 0.04 ms | | | | |
| | 1.12 ms | | | | |
| Trg Lev | 62 | | | | |
| 1/dF | | | | | |
| Y1 | Y2 | Pos | T | delay | Trg |

HOLD

F=1708.9 Hz

I=0.39

FFT