CASP REFERENCE MANUAL

THE CASP TEAM

Contents

1. CASPMODEL - Computational Auditory Signal Processing

1.1. **Support functions.**

1.1.1. *GAMMATONE.* Gammatone filter coefficients

Usage:

- `[b,a] = gammatone(fs,fc,n,beta);`
- `[b,a] = gammatone(fs,fc,n);`

Input parameters:

- `fs` - sampling rate in Hz.
- `fc` - center frequency in Hz.
- `n` - `gammatone` filter order.
- `beta` - bandwidth of the filter.

Output parameters:

- `b` - nominator coefficients.
- a - denominator coefficients.

`GAMMATONE(fs,fc,n,beta)` computes the filter coefficients of a digital `gammatone` filter with center frequency `fc`, bandwidth `beta`, order `n` and sampling rate `fs`.

`GAMMATONE(fs,fc,n)` will do the same but choose a filter bandwidth according to Glasberg and Moore (1990). The order `n` can only be 2 or 4.

`GAMMATONE(fs,fc)` will do as above for a 4th order filter.

If `fc` is a vector, each entry of `fc` is considered as one center frequency, and the corresponding coefficients are returned as row vectors in the output.

The inpulse response of the `gammatone` filter is given by

$$g(t) = at^{n-1}cos(2\pi \cdot fc \cdot t)e^{-2\pi\beta \cdot t}$$

References: [1], [2]

1.1.2. *AUDFILTBW.* Bandwidth of auditory filter.

Usage:

- `bw = audfiltbw(fc)`

`AUDFILTBW(fc)` returns the equivalent rectangular bandwidth of the auditory filter at center frequency `fc`. The function uses the relation

```
bw = 24.7 + fc/9.265
```

as estimated in Glasberg and Moore (1990)

References: [2]

References

[1] A. Aertsen and P. Johannesma. Spectro-temporal receptive fields of auditory neurons in the grassfrog. I. Characterization of tonal and natural stimuli. *Biol. Cybern*, 38:223–234, 1980.

[2] B. Glasberg and B. Moore. Derivation of auditory filter shapes from notched-noise data. *Hearing Research*, 47(1-2):103, 1990.