

# echoSMs Python package

*pip install echosms*

Consistent interface (API) on all models

Historical datasets

Extensive documentation

Tested against Jech et al. (2015) benchmarks

[github.com/ices-tools-dev/echoSMs](https://github.com/ices-tools-dev/echoSMs)

README MIT license

## echoSMs

pypi v0.9.0 license MIT python 3.10 | 3.11 | 3.12 | 3.13

build passing docs passing tests passing

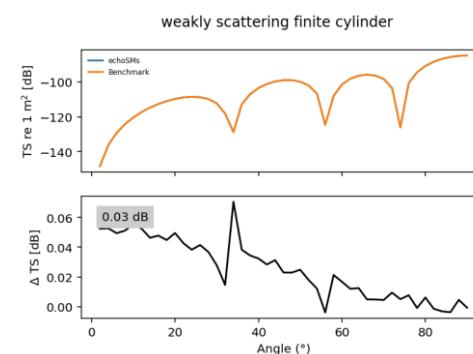
Making acoustic scattering models available to fisheries

EchoSMs provides acoustic scattering models for fisheries

`meth calculate_ts(data, expand=False, inplace=False, multiprocess=False, progress=False)`

Calculate the target strength (TS) for many parameters.

Parameters:



echoSMs

Introduction

Background

Contributing to echoSMs

Scattering Models

Exact Solutions

Approximate Analytical Models and Shapes

Using echoSMs

Developing echoSMs

Conventions

Benchmarks

API reference

Historical notes

Other software

# echoSMs models

Model type
Deformed cylinder
Distorted-wave Born approximation (& stochastic)
*Elastic sphere
*High pass
Kirchhoff approximation
Kirchhoff ray mode
Model series solution
Prolate spheroidal model series
Phase-tracking distorted-wave Born approximation

Jech et al. models not currently in echoSMs:  
FMM, FEM & BEM

\* Models not in Jech et al.

# Other echoSMs objectives

A place to list other model codes

[ices-tools-dev.github.io/echoSMs/other\\_software/](https://ices-tools-dev.github.io/echoSMs/other_software/)

A place to store model codes & data (if wanting a home)

Clay & Horne KRM BASIC code & data

Krill DWBA shapes

We welcome other historical codes & data  
in any language or format

## Other software

Other software that provides source code for

- [acousticTS](#): R code for calculating scattering of calibration spheres.
- [Coupled BEM acoustic](#): Julia code that models swimbladder).
- [FishAcoustics](#): Contains a Python module for pass models.
- [Hydrac](#): Contains Python code that implements pass models. Hydrac is a package for calculating scattering from fish.
- [KRM Model](#): A web page that uses the KRM model to calculate scattering from fish given input parameters.

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### Acoustic models of fish: The Atlantic cod (*Gadus morhua*)

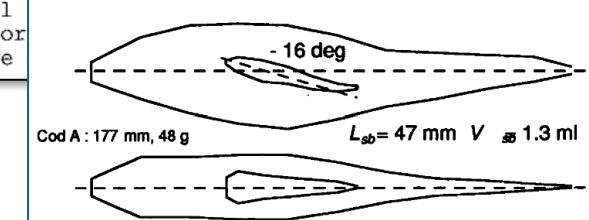
Clarence S. Clay; John K. Horne

 Check for updates

J. Acoust. Soc. Am.

<https://doi.org/10.112>

GOTO 12  
200 'compute  
'Computations are reduced, S(ka)/L  
' b0 = -1/(1+ic0)  
'S(ka)/L = -i(1/pi) b0 = (1/pi) [c0/(1+c0^2) + i/(1+c0^2)]  
'Use Clay J. Acoust. Soc. Am. 89. 2168-2179 (1991)  
'Use polynomial  
'subroutines for  
'when the range



Documentation: <https://ices-tools-dev.github.io/echoSMs>

Demo: [https://colab.research.google.com/github/ices-tools-dev/echoSMs/blob/main/docs/Workshop demo.ipynb](https://colab.research.google.com/github/ices-tools-dev/echoSMs/blob/main/docs/Workshop%20demo.ipynb)