

ISSN 1000-310X  
CN 11-2121/O4

# 应用声学

*Journal of Applied Acoustics*

第 43 卷

Vol.43

中国科学院声学研究所 主办



科学出版社  
Science Press

出版

1  
2024

# 应用声学

(YINGYONG SHENGXUE)

(双月刊)

第 43 卷 第 1 期 2024 年 1 月

## 目次

### 研究报告

- 遗传算法优化变分模态分解提取舰船辐射噪声特征线谱方法·····沈鑫玉 陈涛 郭良浩 刘建军 陈艳丽 (1)
- 深海声影区时频谱干涉结构与声源定位·····刘与涵 郭良浩 章伟裕 闫超 董阁 (12)
- 基于遗传算法的不等间距阵优化方法·····陈新华 段文彬 郑恩明 (24)
- 基于四水听器的充水弹性管声速测量方法·····寻天雨 邹新宇 郁高坤 (32)
- 波束开角对多普勒测频结果的影响·····陈苗 王长红 邓锴 (40)
- 点云投影结合轻量化卷积神经网络实现三维成像声呐快速目标分类·····任露露 尹力 巩文静 李宝奇 黄海宁 (47)
- 辨析声调的标度和归类方法——纪念赵元任先生标调理论发表 100 年·····吕士楠 (58)
- 多通路空间声的前方四扬声器局域 Ambisonics 信号馈给法·····张驰 谢菠菀 (64)
- 某商用车怠速油底壳异响问题分析·····徐小翔 李超 曾小春 王毅 陈齐平 (76)
- 纯电动汽车车身泄压阀引起的低频涡声耦合问题识别分析·····沈龙 张军 黄应来 李欣 宋琼 (82)
- 某乘用车加速工况车内轰鸣声诊断及控制方法·····蒋邹 梁莹 吴文栋 罗玉军 (90)
- 基于低频吸声超构材料的复合消声器·····陈键 李治含 黄唯纯 钟雨豪 陈龙虎 卢明辉 陈延峰 (95)
- 矩形单元声场波函数构造及其应用·····贺佐潦霜 向宇 石梓玉 陈岩豪 陆静 (100)
- 基于改进最小方差无失真响应角度谱算法的气体泄漏定位方法·····王天琪 杨祥国 晏园 刘成龙 张金磊 (110)
- 声纹信号-图形差分场增强和多头自注意力机制的变压器工作状态辨识方法·····张寒 熊云 唐信 王泉 (119)
- 合成语声的声学分析及识别特征算法·····周峻林 胡晓光 黄子旭 汪旭 付哲宇 (131)
- 船用三通调节阀流-固耦合噪声数值模拟·····施红旗 周旭 周爱民 张博浩 李树勋 (142)
- 硅油介质中矩形电容式微机械超声换能器发射与接收声场特性研究·····高碧珍 张赛 何常德 王智豪 王子渊 张文栋 (151)
- 面向开环扫描系统的超声图像畸变校正方法·····张金英 史亦凡 吴先梅 (160)
- FCM-FastICA 的点蚀声发射信号分离识别方法·····姚俊宇 张颖 赵鹏程 王雪琴 钱一呈 (169)
- 高频聚焦超声声场和温度场的仿真研究·····徐慧 陈思 幸柏成 单天琪 赵渊 (178)
- 超声焊接全状态频率跟踪算法·····姚震 罗子伦 刘凯捷 丁荣杰 莫毅强 何建 乌斯别斯基·亚历山大 (190)
- 基于改进粒子群算法的超声雾化电源频率跟踪·····胡航溢 许龙 郑伟成 罗凯 (198)
- 自由空间内悬挂气泡破碎时的声学特性·····段润泽 曹一凡 冯紫薇 (204)
- 圆柱类构件超声相控阵聚焦模型·····孔惠元 王鉴 李仰军 韩焱 (213)

### 综述

- 空气耦合超声检测复合材料研究综述·····郭占玲 沈斌 赵志钢 刘瑶 (223)

### 声学新闻和动态

- 2023 年国际超声大会在北京成功举行·····刘琳 (57)

# JOURNAL of APPLIED ACOUSTICS (BIMONTHLY)

Vol. 43, No. 1, January, 2024

## CONTENTS

### Research Articles

- Feature line spectrum extraction of ship radiated noise based on variable mode decomposition optimized by genetic algorithm..... SHEN Xinyu CHEN Tao GUO Lianghao LIU Jianjun CHEN Yanli ( 1 )
- Interference patterns and source localization in the shadow zone of deep water..... LIU Yuhan GUO Lianghao ZHANG Weiyu YAN Chao DONG Ge ( 12 )
- Unequally spaced array optimization based on genetic algorithm..... CHEN Xinhua DUAN Wenbin ZHENG Enming ( 24 )
- Method for sound velocity measurement in a water-filled elastic tube with four hydrophones..... XUN Tianyu ZOU Xinyu YU Gaokun ( 32 )
- The influence of beam angle on Doppler frequency measurement result..... CHEN Zhuo WANG Changhong DENG Kai ( 40 )
- Point cloud projection combined with lightweight convolutional neural network realizes fast target classification of 3D imaging sonar..... REN Lulu YIN Li GONG Wenjing LI Baoqi HUANG Haining ( 47 )
- Distinguish between calibration and classification of tone——To commemorate Mr. Zhao Yuanren standard tone theory published for 100 years..... LYU Shinan ( 58 )
- Local Ambisonics signal mixing method for four frontal loudspeakers in multichannel spatial sound..... ZHANG Chi XIE Bosun ( 64 )
- Analysis and research on abnormal noise of idle oil pan of a commercial vehicle..... XU Xiaoxiang LI Chao ZENG Xiaochun WANG Yi CHEN Qiping ( 76 )
- Analysis and identification of low frequency vortex-acoustic coupling problem caused by decompression air vent of electric vehicle..... SHEN Long ZHANG Jun HUANG Yinglai LI Xin SONG Qiong ( 82 )
- Diagnosis analysis and control method of booming noise in car's passenger..... JIANG Zou LIANG Ying WU Wendong LUO Yujun ( 90 )
- Composite muffler based on low-frequency sound absorbing metamaterials..... CHEN Jian LI Zhihan HUANG Weichun ZHONG Yuhao CHEN Longhu LU Minghui CHEN Yanfeng ( 95 )
- Construction and application of wave function of sound field of rectangular element..... HE Zuoliaoshuang XIANG Yu SHI Ziyu CHEN Yanhao LU Jing (100)
- Gas leak location method based on improved minimum variance distortionless response angle spectrum algorithm..... WANG Tianqi YANG Xiangguo YAN Yuan LIU Chenglong ZHANG Jinlei (110)
- Transformer working state identification method based on voiceprint signal-motif difference field enhancement and multi-head self-attention mechanism..... ZHANG Han XIONG Yun TANG Xin WANG Xiao (119)
- Acoustic analysis and recognition feature algorithm of synthetic speech..... ZHOU Junlin HU Xiaoguang HUANG Zixu WANG Xu FU Zheyu (131)
- Numerical simulation of fluid-solid coupling noise in marine three-way control valve..... SHI Hongqi ZHOU Xu ZHOU Ai'min ZHANG Bohao LI Shuxun (142)
- The characteristics of transmitting and receiving sound field of rectangular capacitive micromechanical ultrasonic transducer in silicone oil medium..... GAO Bizhen ZHANG Sai HE Changde WANG Zhihao WANG Ziyuan ZHANG Wendong (151)
- Ultrasonic image distortion correction approach for open-loop scanning system..... ZHANG Jinying SHI Yifan WU Xianmei (160)
- Pitting acoustic emission signal separation and recognition method based on FCM-FastICA..... YAO Junyu ZHANG Ying ZHAO Pengcheng WANG Xueqin QIAN Yicheng (169)
- Simulation study of high frequency focused ultrasound sound field and temperature field..... XU Hui CHEN Si XING Baicheng SHAN Tianqi ZHAO Yuan (178)
- Full-state frequency tracking algorithm of ultrasonic welding..... YAO Zhen LUO Zilun LIU Kaijie DING Rongjie MO Yiqiang HE Jian USPENSKIY Alexander (190)
- The frequency tracking of the ultrasonic atomization power supply based on improved particle swarm optimization..... HU Hangyi XU Long ZHENG Weicheng LUO Kai (198)
- Acoustic emission process during bubble bursting in free space..... DUAN Runze CAO Yifan FENG Ziwei (204)
- The ultrasonic phased array focusing model of cylindrical component..... KONG Huiyuan WANG Jian LI Yangjun HAN Yan (213)

### Reviews

- Development status of air-coupled ultrasonic testing composites..... GUO Zhanling SHEN Bin ZHAO Zhigang LIU Yao (223)

- Acoustics Highlight**..... LIU Lin ( 57 )

《中文核心期刊要目总览》收录期刊  
中国科技核心期刊  
中国科学引文数据库来源期刊

# 应用声学

JOURNAL of APPLIED ACOUSTICS



双月刊 (1982年创刊)  
第43卷 第1期 2024年1月

Bimonthly (Since 1982)  
Vol. 43 No.1 Jan., 2024

主管	中国科学院	Supervised by	Chinese Academy of Sciences
主办	中国科学院声学研究所	Sponsored by	Institute of Acoustics, Chinese Academy of Sciences
主编	王秀明	Editor-in-Chief	WANG Xiuming
编辑	《应用声学》编辑委员会 中国声学学会	Edited by	Editorial Board of Journal of Applied Acoustics The Acoustical Society of China
地址	北京海淀区北四环西路21号 (100190)	Address	No.21, North 4 <sup>th</sup> Ring Road West, Haidian District, Beijing 100190, P. R. China
电话	010-82547761	Telephone	010-82547761
电子邮箱	yysx@mail.ioa.ac.cn	E-mail	yysx@mail.ioa.ac.cn
网址	http://yysx.cnjournals.cn	Website	http://yysx.cnjournals.cn
印刷装订	北京科信印刷有限公司	Printed by	Beijing Kexin Printing Co., Ltd.
出版发行	科学出版社	Published by	Science Press
发行范围	国内外公开	Distributed by	Beijing Bureau for Distribution of Newspapers & Periodicals, local post offices (domestic), and China International Book Trading Corporation, P.O.Box 399, Beijing 100044, China (abroad)
国内发行	中国邮政集团公司 北京市报刊发行局		
订购处	全国各地邮局		
国外发行	中国国际图书贸易集团有限公司 (北京399信箱, 100044)		

中国标准 ISSN 1000-310X  
连续出版物号: CN 11-2121/O4

邮发代号: 国内 2-561  
国外 BM607

定价: 每期 80 元  
全年 480 元

ISSN 1000-310X



9 771000 310246

01>