

论文

一种新的实时电磁逆散射方法

张清河,肖柏勋,朱国强

1 武汉大学电子信息学院, 武汉 430079 2 长江大学地球物理与石油资源学院, 湖北 荆州 434023

收稿日期 2005-8-29 修回日期 网络版发布日期 接受日期

摘要 为解决介质圆柱体逆散射问题, 提出一种新的在线逆散射方法, 通过支持向量机将逆散射问题转化成一个回归估计问题. 该方法可应用于各种逆散射方面, 尤其是目标的几何与电磁参数重构和埋地目标探测. 文中首次将支持向量机方法应用到该领域, 设置多个散射场的观测点, 通过提取散射场的不同信息作为样本信息训练支持向量机, 建立了介质圆柱体的逆散射模型, 利用该模型重构了介质圆柱体的电磁参数, 同时探测了埋地位置. 数值结果显示了该方法的有效性和准确性, 为目标的实时逆散射研究提供了一种有效方法.

关键词 [支持向量机](#) [介质圆柱体](#) [逆散射](#) [埋地目标](#)

分类号

DOI:

**A new solution of real time electromagnetic inverse scattering**

ZHANG Qing He, XIAO Bo Xun, ZHU Guo Qiang

1 School of Electronics Information, Wuhan University, Wuhan 430079, China 2 School of Geophysical and Petroleum Resource, Changjiang University, Hubei Jing zhou 434023, China

Received 2005-8-29 Revised Online Accepted

**Abstract** In order to deal with the inverse scattering of dielectric circular cylinder, a new online methodology is applied to the solution of microwave inverse scattering problems. The inverse scattering problem is recast into a regression estimation one by means of a support vector machine(SVM). The approach can be applied to various inverse scattering problems, and it is very suitable to deal with the geometric and dielectric characterization reconstruction and the buried object detection. For the first time this paper applies the support vector machine to the field. The scattered electric field is measured at some points. The SVM is trained using different sample data extracted from the scattered field. The inverse scattering model of dielectric circular cylinder has been setup. The relative dielectric permittivity and the electric conductivity of dielectric circular cylinder are reconstructed and the center position of buried object are detected. The results show that this method is effective and efficient and provides a highly efficient solution for the real time inverse scattering of objects.

**Key words** [Support vector machine\(SVM\)](#); [Dielectric circular cylinder](#); [Inverse scattering](#); [Buried object](#)

通讯作者:  
[zhangqh6973@163.com](mailto:zhangqh6973@163.com)  
作者个人主页: 张清河; 肖柏勋; 朱国强

扩展功能	
本文信息	
▶	<a href="#">Supporting info</a>
▶	<a href="#">PDF</a> (OKB)
▶	<a href="#">[HTML全文]</a> (OKB)
▶	<a href="#">参考文献</a>
服务与反馈	
▶	<a href="#">把本文推荐给朋友</a>
▶	<a href="#">加入我的书架</a>
▶	<a href="#">加入引用管理器</a>
▶	<a href="#">引用本文</a>
▶	<a href="#">Email Alert</a>
▶	<a href="#">文章反馈</a>
▶	<a href="#">浏览反馈信息</a>
相关信息	
▶	<a href="#">本刊中 包含“支持向量机”的 相关文章</a>
▶本文作者相关文章	
·	<a href="#">张清河</a>
·	<a href="#">肖柏勋</a>
·	<a href="#">朱国强</a>