

## 用于肿瘤消融的高强聚焦超声

**【项目描述】:** 高强聚焦超声可利用空化现象来液化、消融大块机体组织。这种新颖的低侵入性方法依靠大量空化泡或空化云实现肿瘤移除手术目的。本项目致力于发展快速准确的空化云计算和消融预测方法，并以代码可植入于超声手术仪器为导向。我们的目标是通过这些研究，实现术前规划的优化，即提高肿瘤消融的效率和精度，为高强超声的机械消融在我国实现临床试验奠定基础。

**【职位概述】:** 我们正在寻求一位基础扎实、主观能动性、对实验和模拟并行的生物医学科研方法感兴趣的科研助理，因此，我们需要其专注细节、严格遵循实验步骤。理想的候选人应具有热流耦合、多相流和热质传递理论方面的相关背景，并热衷于编码。比如，相关研发工作需要科研助理通过编码预测空化云的时空轨迹，并运用高速成像捕捉空化云以验证仿真准确性。最后，候选人应具有积极学习新事物和挑战自我的能力，比如学习图像处理以量化实际有效空化云的轮廓。本项目的第二年会涉及训练神经网络，从而将基于物理的神经网络引入数值方法的加速中去。

### **【职位要求】:**

- 机械工程（热流方向）、生物医学工程等相关专业的学士及以上学历，或数学（理想是机器学习方向）、统计学（理想是数据驱动的机器学习方向）等相关背景。
- 熟练研发中的常用编程工具（如 MATLAB、Python、或 C）。
- 有准备科研报告和学术期刊论文的经验。

得益于本学院的聚焦性科研延展（FREE）项目，候选人将有机会获取开展科研工作所需的专业技能和实操技能，从而增加申请博士或硕士研究生项目获批的可能性以及获得工业届长期工作的机会。该职位拟于 2024 年春季学期或之后开始，雇佣期限为两年，合同为一年一签。有关此项目的问题，请联系徐进博士，电子邮件：[jin.xu@scupi.cn](mailto:jin.xu@scupi.cn)。

## **High-Intensity Focused Ultrasound (HIFU) for Mechanical Ablation of Tumor**

**Project Description:** High-intensity focused ultrasound (HIFU) can be used to ablate bulk tissue through inertial cavitation. When applying this minimally invasive technique, bubbles are excited and maintained to liquefy the target tissue. The main goal of this project is to develop a fast computational tool with reasonable accuracy that eventually could be seamlessly integrated into a HIFU surgical machine, and thereby guide the optimization of treatment plan, namely, effectively treating a target volume and efficiently covering the target region with an optimal scan format and ultrasonic administration specifics at each treatment location.

**Job Description:** We are seeking a skilled and motivated candidate interested in taking on an approach of combining experiment and numerical simulation for biomedical engineering research. Therefore, attention to details and ability to follow experimental protocols are expected of the candidate. The ideal candidate will have a background in thermal-fluids and experience in multiphase flow and/or heat/mass transfer, and a passion for coding. For instance, the candidate will use high-speed imaging equipment and obtain shadowgraphs for bubble clouds in parallel with prediction of cloud progression through coding. S/he also should have a can-do attitude and the willingness to explore new things, *e.g.*, image processing for determination of bubble cloud envelope. As another example, the 2<sup>nd</sup> year of this project would involve acceleration of the numerical simulation by using numerical results to train a deep learning network and incorporating physics-informed neural network into flow prediction.

### **Basic Qualifications of the Candidate:**

- Master's or Bachelor's degree in Mechanical or Biomedical Engineering, Math, Statistics, or a related field with a focus on machine learning.
- Familiarity with programming languages MATLAB, C or Python.
- Experience in literature review, report drafting, and preparation of journal manuscripts.

This position is funded through Focused Research Extended Experience (FREE) scholarship at our Institute. We believe that this experience and the resulting publication(s) will help the candidate hone research skills and enhance his/her chance in obtaining offers from reputable graduate programs or industry. This position is available immediately, with a negotiable start date no later than May 2024. The term of employment spans two years, and the contract is structured for annual renewal. For questions regarding this position, please contact Dr. Jin Xu, at [jin.xu@scupi.cn](mailto:jin.xu@scupi.cn).