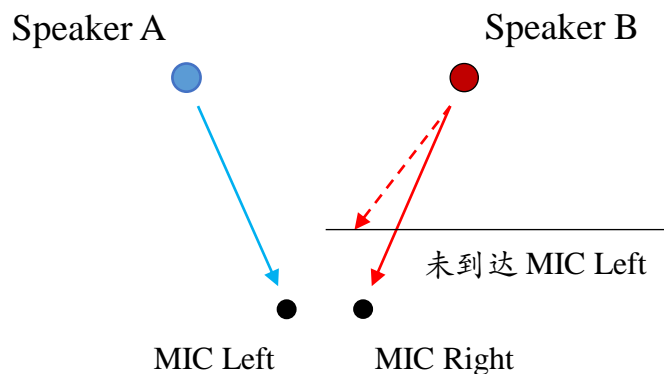


Reference

Kim, C., Kumar, K., Raj, B., & Stern, R.M. (2012). Signal separation for robust speech recognition based on phase difference information obtained in the frequency domain. *Interspeech*.

基于频域获得的相位差信息进行鲁棒语音识别的信号分离

Principle



$$\begin{aligned} \boxed{1} \quad x_L(t) &= x_R(t - \tau) \Rightarrow x_L[n] \cdot w[n] = x_R[n] \cdot w[n] \\ &\xrightarrow{\text{DFT}} X_L[k] \approx e^{-j\omega_k \tau_k} X_R[k] \\ &\Rightarrow |\tau_k| = \min_r \frac{1}{|\omega_k|} |\angle X_L[k] - \angle X_R[k] - 2\pi r| \end{aligned}$$

$$\boxed{2} \quad \mu_k = \begin{cases} 1, & |\tau_k| \leq \tau_m \\ \eta, & |\tau_k| > \tau_m \end{cases} \quad \begin{array}{l} \text{判决阈值: 在当前的时间切片内, 能够分辨} \\ \text{Speaker A 和 Speaker B 音源的时间点。} \end{array}$$

抑制系数

$$\boxed{3} \quad \tilde{x}_A[n] \xleftarrow{\text{IDFT}} \tilde{X}_A[k] = \mu_k \cdot \frac{1}{2} (X_L[k] + X_R[k])$$

Algorithm

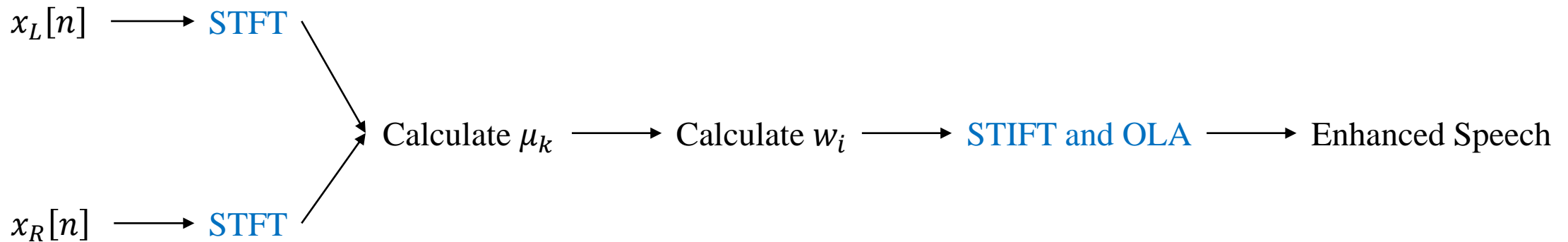
Improved

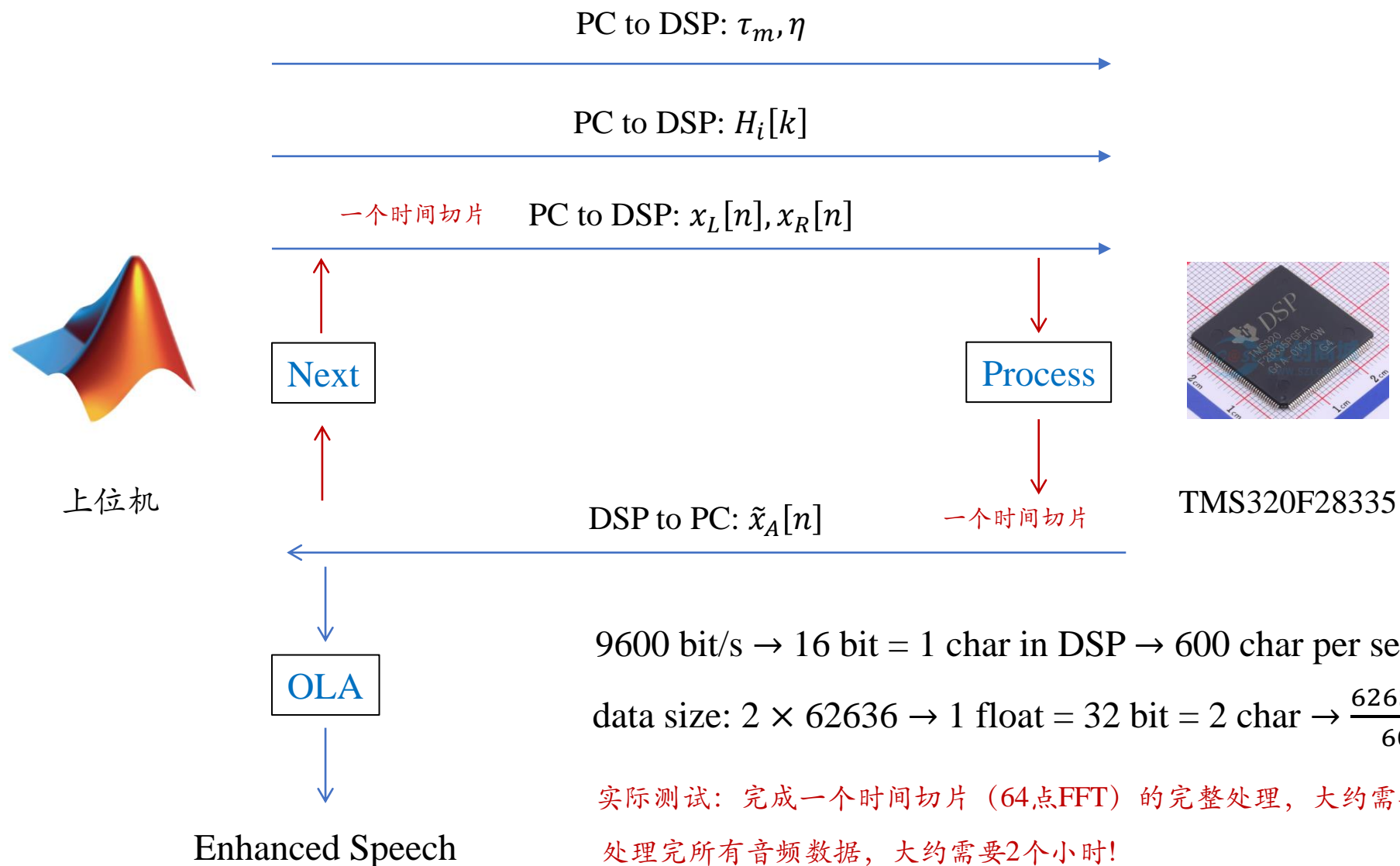
模拟人耳听觉特性

Gammatone channel weighting

$$\boxed{2} \quad \mu_k = \begin{cases} 1, & |\tau_k| \leq \tau_m \\ \eta, & |\tau_k| > \tau_m \end{cases} \quad \Rightarrow \quad w_i = \frac{\sum_{k=0}^{\frac{N}{2}-1} \mu_k |\bar{X}[k] H_i[k]|}{\sum_{k=0}^{\frac{N}{2}-1} |\bar{X}[k] H_i[k]|}, \quad \bar{X}[k] = \frac{1}{2} (X_L[k] + X_R[k]) \quad \Rightarrow \quad \mu_g[k] = \max \left(\frac{\sum_{i=0}^{I-1} w_i |H_i[k]|}{\sum_{i=0}^{I-1} |H_i[k]|}, \eta \right)$$

Flow chart





9600 bit/s \rightarrow 16 bit = 1 char in DSP \rightarrow 600 char per second.

data size: $2 \times 62636 \rightarrow$ 1 float = 32 bit = 2 char $\rightarrow \frac{62636 \times 4}{600} \approx 418$ s

实际测试：完成一个时间切片（64点FFT）的完整处理，大约需要2 s
处理完所有音频数据，大约需要2个小时！

How to realize FFT in F28335?

FPU+DSP库

CONTROLSUITE

controlSUITE™ 软件套件：C2000™ 微控制器的必备软件和开发工具

概述 | 下载 | 技术文档 | 相关设计资源 | 支持与培训

概述

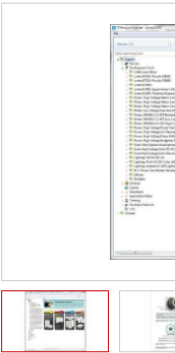
用于 C2000™ 微处理器的 controlSUITE™ 是一套全面的软件基础设施和软件工具集，旨在最大程度地缩短软件开发时间。从特定于器件的驱动程序和支持软件到复杂系统应用中的完整系统示例，controlSUITE™ 在每个开发和评估阶段都提供了程序库和示例。超越简单的代码段 - 立即使用实用型软件来开始设计您的实时系统。

如果 controlSUITE 可执行安装程序不运行，请下载“支持软件”下方的 controlSUITE 压缩包。需要将此压缩包解压到 C 盘，其将不提供自动更新，也不会将 controlSUITE Desktop 添加到 Windows 的开始菜单。

特性

- Centralized, interactive, software repository for C2000 real-time controllers
- Graphical User Interface (GUI) for intuitive navigation of software, development kits, libraries, user guides, application notes, and more.
 - Auto-loading of Code Composer Studio example projects
- Device software and support
 - Access header files, Flash API, Boot ROM source code
 - Example projects
 - Device-specific documentation

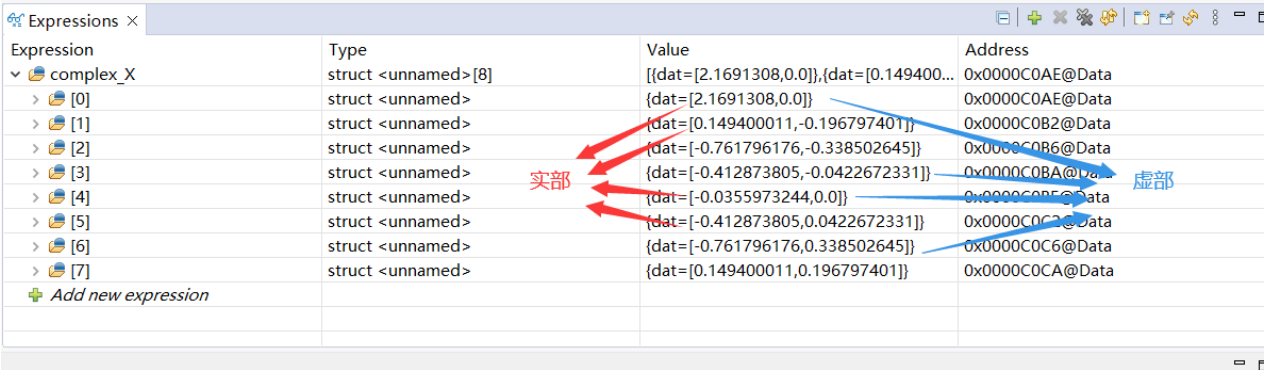
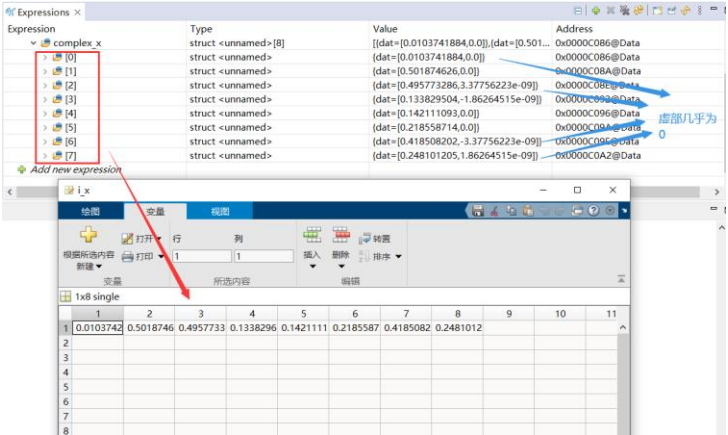
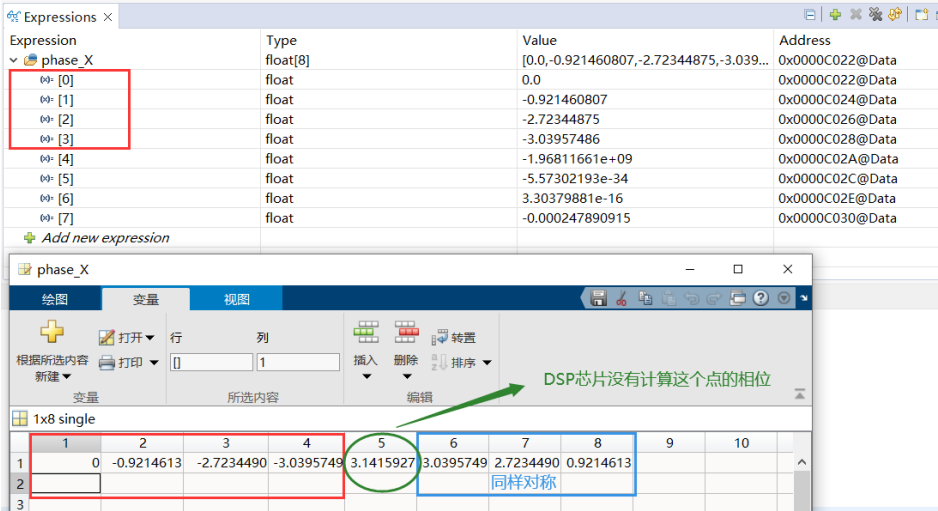
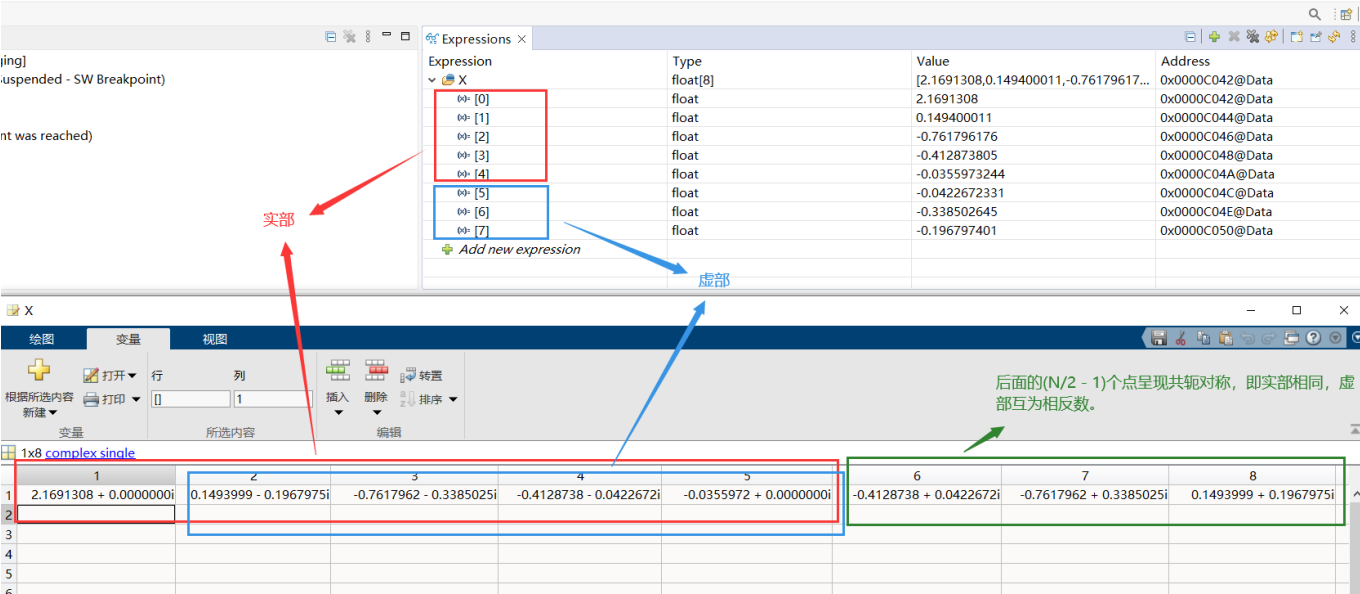
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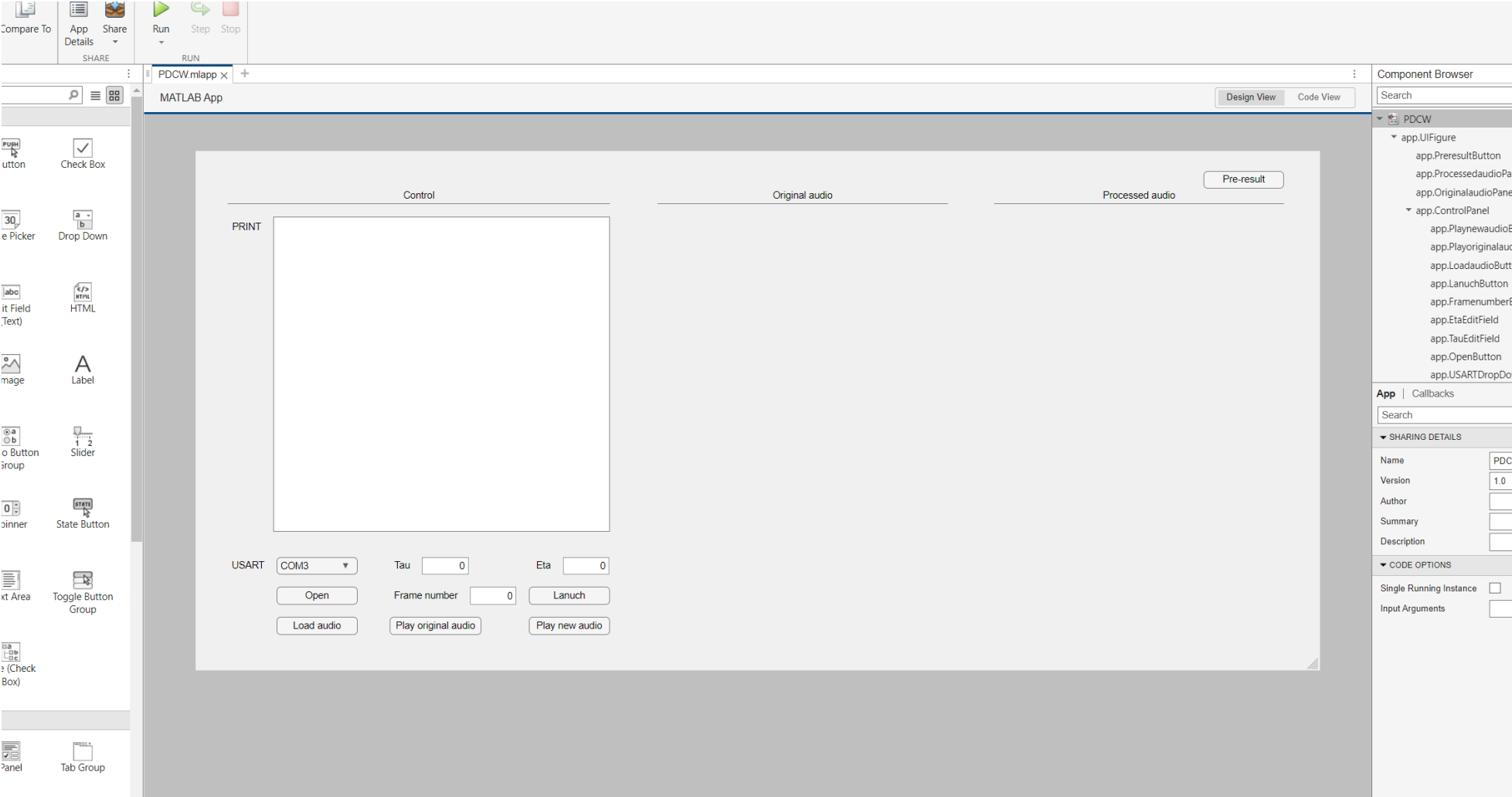
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2833x_RFFT	2024/4/15 23:21	文件夹	
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macros	2013/8/15 13:51	配置设置	1 KB

Modify the FFT result

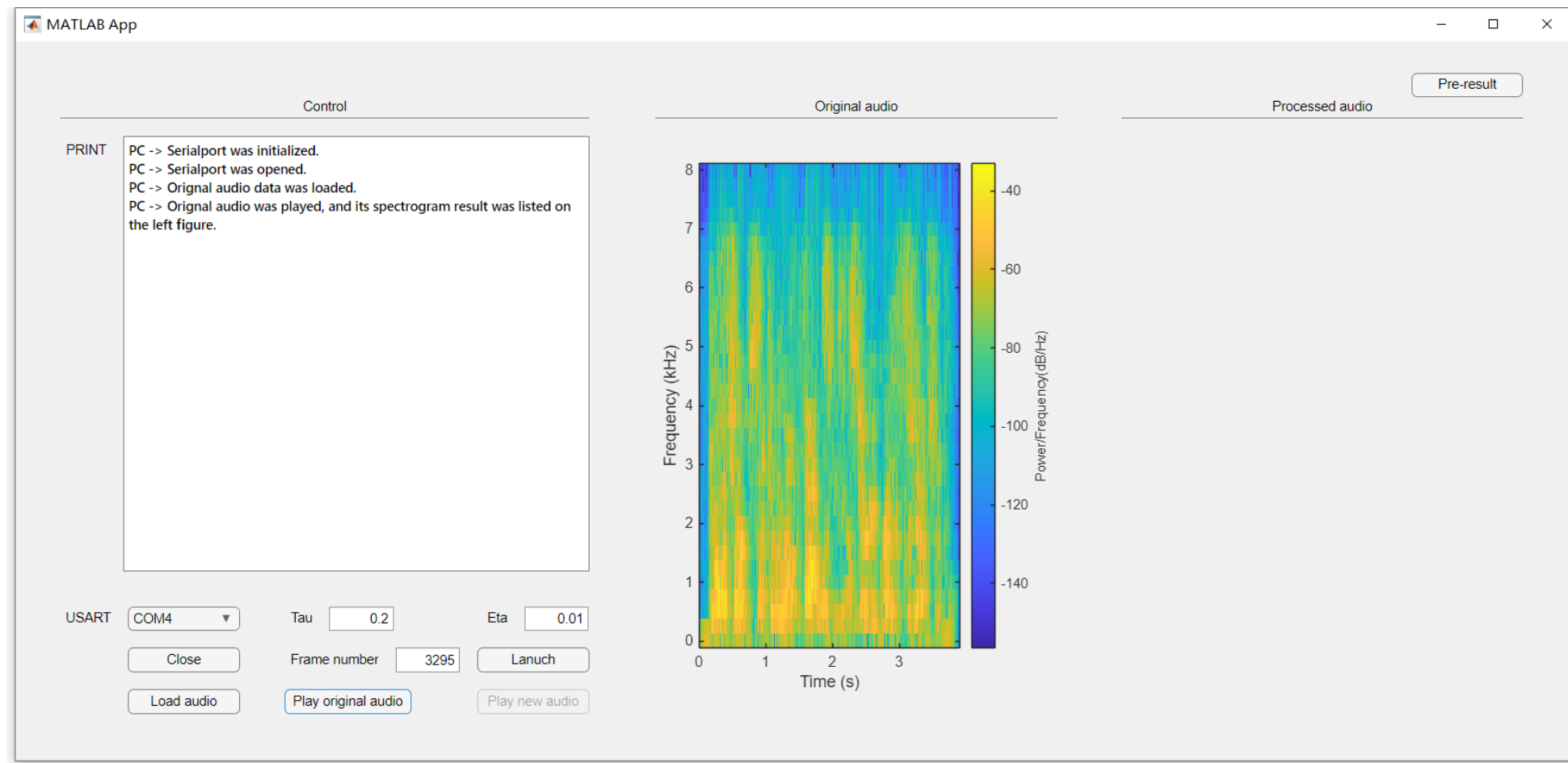
匹配MATLAB



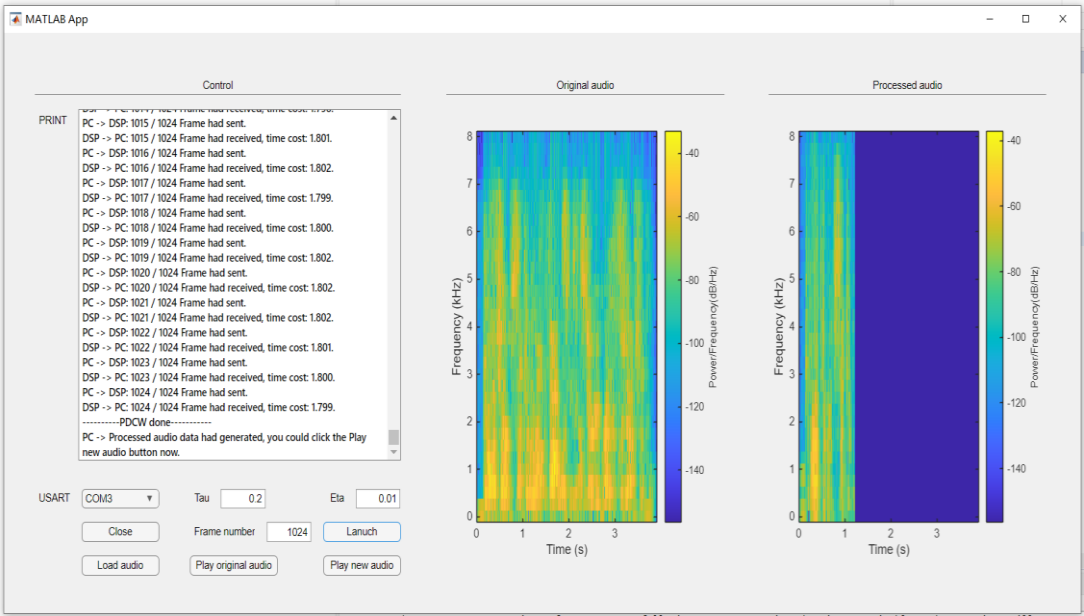
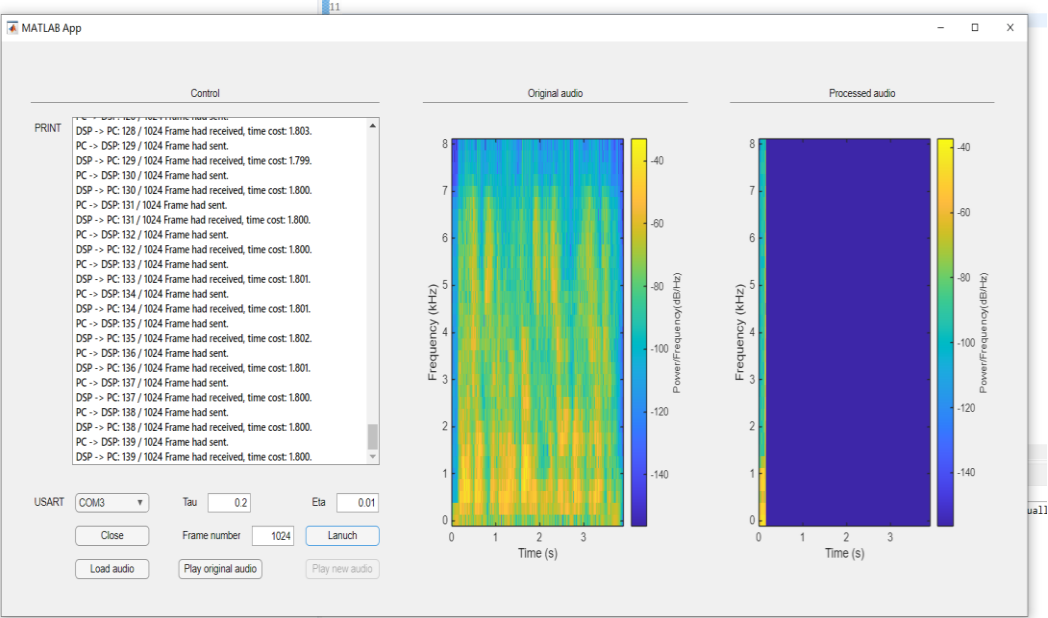
上位机开发



原始音频

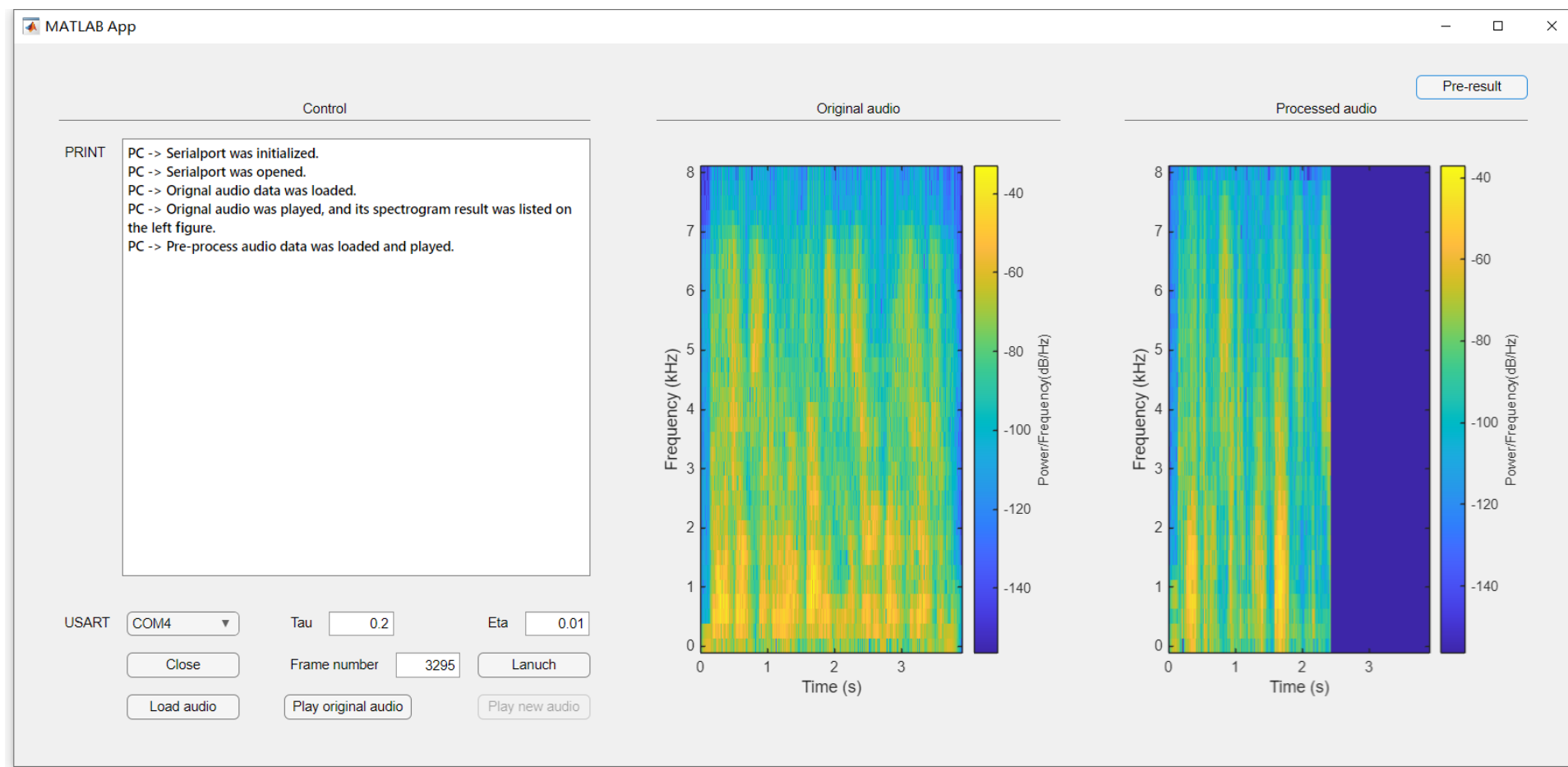


实时处理

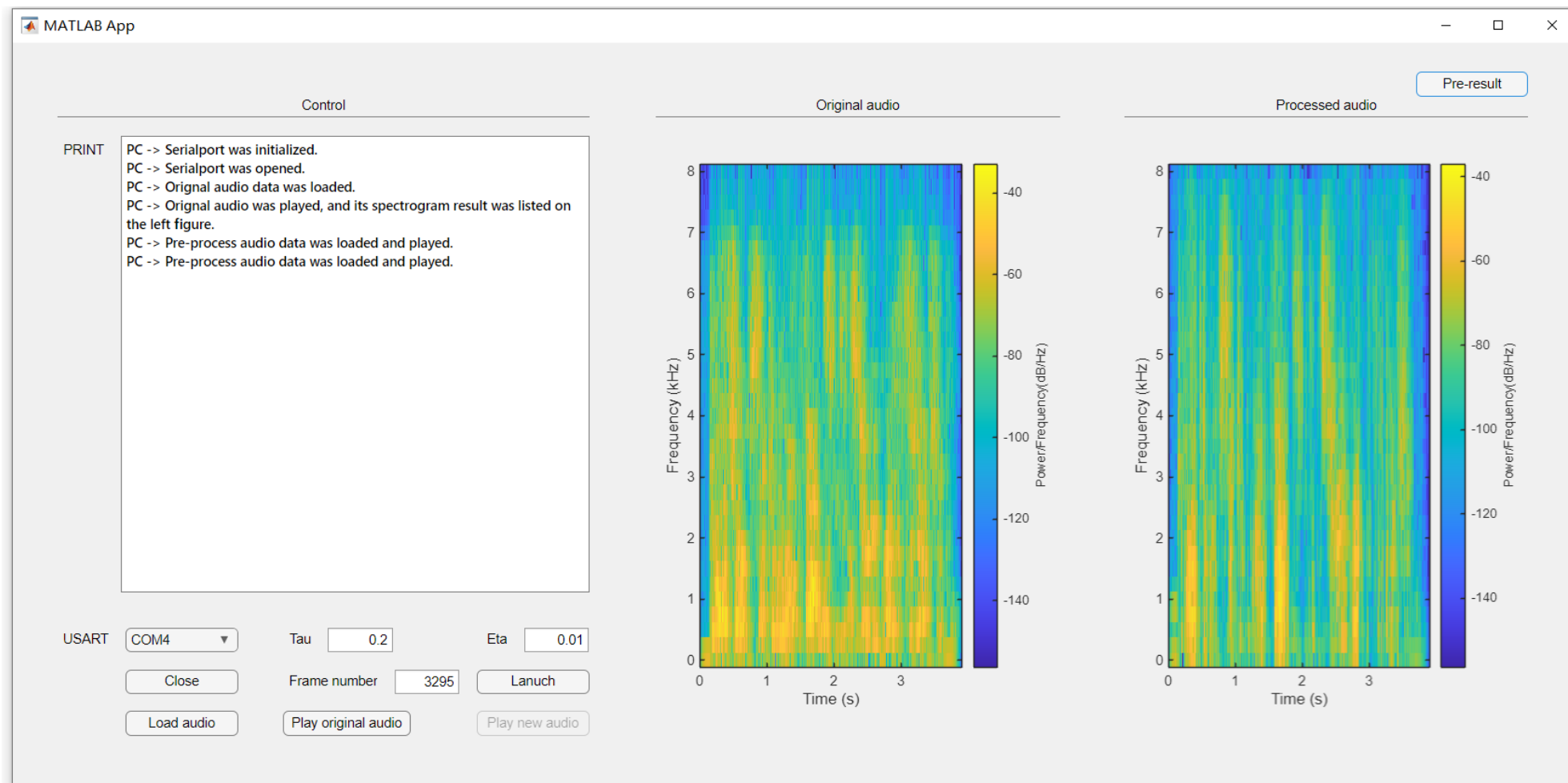


Warning: Loaded: One or more sections of your program fall into a memory region that is not writable. These regions will not acti

最终结果



最终结果



The END

THANKS