Rapid Antibiotic Susceptibility Test (#7492)

Technology, analysis (software), and procedures to drastically shorten the time to complete an antibiotic susceptibility test

Georgia Tech inventors have developed the technology, analysis (software), and procedures to shorten the antibiotic susceptibility test of bodily fluids from ~68 hours to ~8 hours or less – even when the sample has an extremely low bacterial count. The approach uses flow cytometry and statistical analysis to circumvent a lengthy culture-based amplification. The methods are machine-independent, robust, and could drastically reduce the time to appropriate treatment to improve patient outcomes and reduce antibiotic resistance proliferation. This invention consists of software-based distance metrics for recovering bacteria from blood, and methods of rapidly analyzing samples in a label-free manner, comparing antibiotic-exposed bacterial samples to paired no-antibiotic controls, and quantitatively determining sensitivity profiles.

Benefits/Advantages

- Relatable: Does not rely on genetic detection, making it more general and directly relatable to traditional ASTs used clinically
- Faster: Can perform ASTs in 1/8th of the time of current ASTs
- Improved accuracy: Decreases technician time and handling, improving accuracy and treatment

Potential Commercial Applications

- Blood culture and sensitivity testing

Background/Context for This Invention

Bacterial infections of the blood can often lead to sepsis – a very dangerous immune response with a high mortality rate if not treated quickly with the appropriate antibiotics. However, choosing the appropriate treatment requires knowledge of bacterial identity and whether the bacteria will be susceptible (versus resistant) to particular antibiotics. Because the number of bacteria in a blood (or other bodily fluid) sample is often extremely low, bacteria must first be amplified through blood culture, followed by purification and antibiotic susceptibility tests (ASTs). This process takes multiple days, while the patient's infection continues to worsen before antibiotics are even started. Therefore, there is a dire need for a quicker antibiotic susceptibility test.

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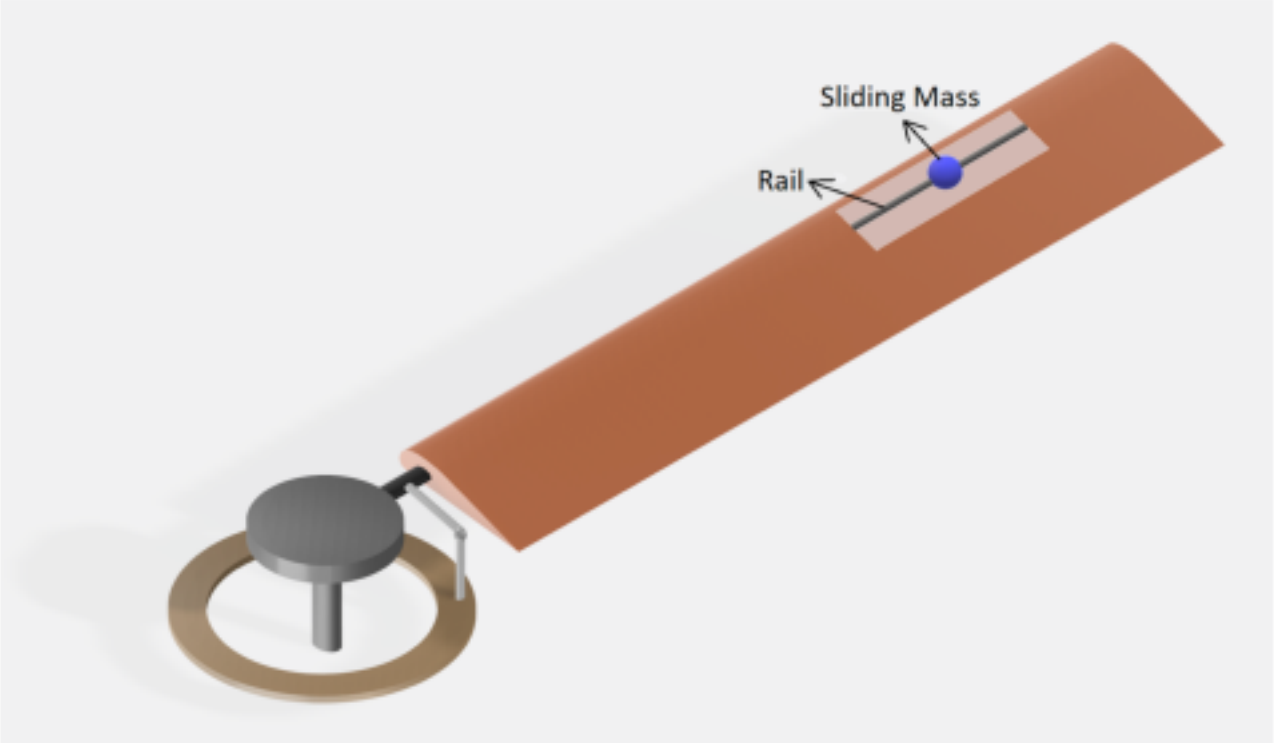
More Information

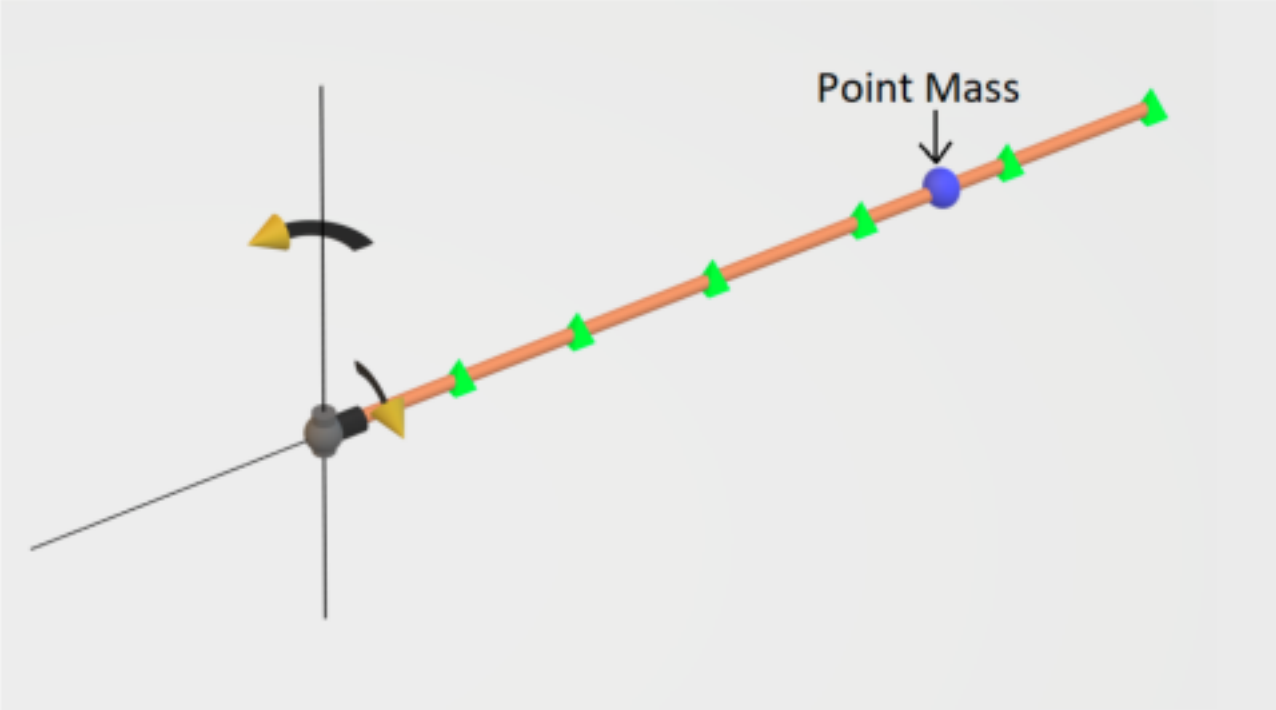
Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/rapid-antibiotic-susceptibility-test

Images:



Hingeless blade with a sliding mass



Blade model with sliding point mass

Eliminating Resonances

$\mu_N = 0.3$: 180 → 230 RPM

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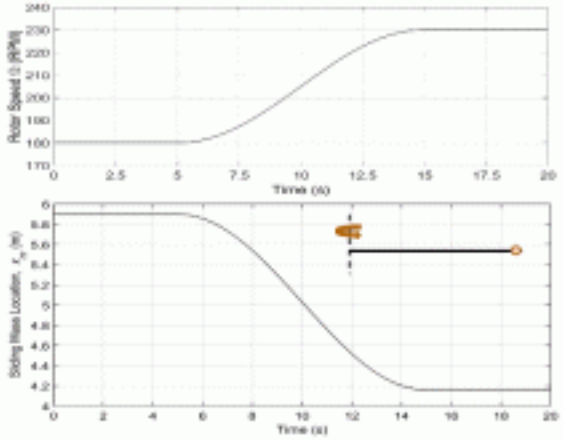

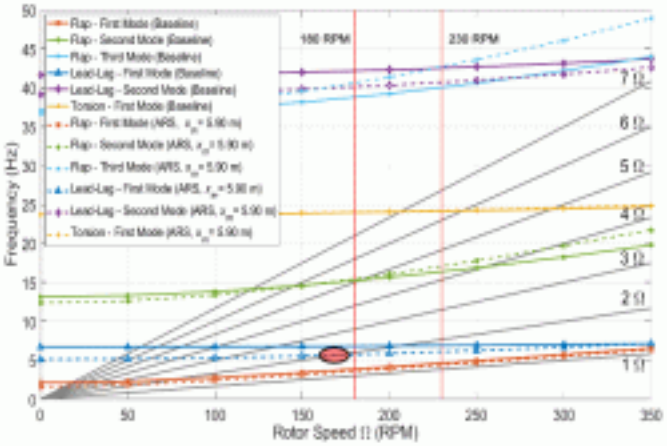

- The mass is moved inwards
- The resonance point moves back to its original location; always stays behind the operating Ω

Eliminating Resonances

$\mu_N = 0.3$: 230 → 180 RPM

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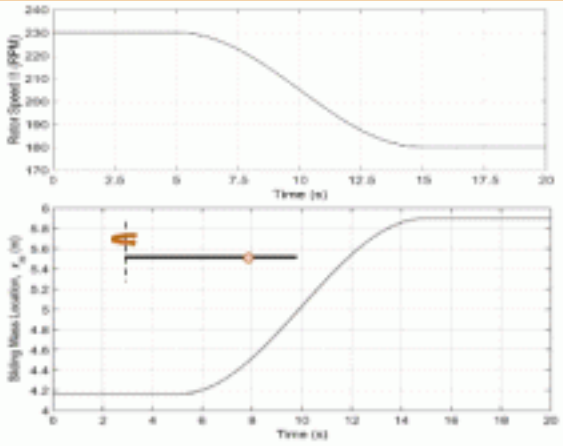

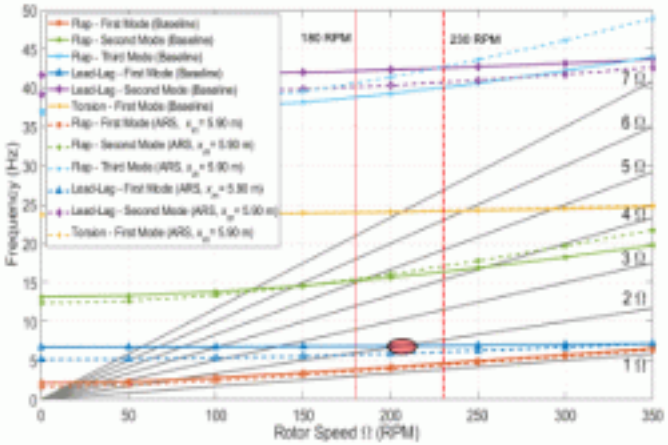

- The mass is moved towards the tip of the blade; x_m is changed smoothly
- The resonance point is moved below 180 RPM