

Episode 7: Space Soundwaves



1
00:00:00,700 --> 00:00:02,230
Station Houston on Two.

2
00:00:02,230 --> 00:00:05,300
Don, looks good from here, you
can go ahead and press play.

3
00:00:05,300 --> 00:00:07,560
Okay, I'm going to hit play now.

4
00:00:07,560 --> 00:00:13,710
This one involves using these little speakers
I found that we have with our laptop computers.

5
00:00:13,710 --> 00:00:16,150
They have a little grate on front.

6
00:00:16,150 --> 00:00:21,450
I happened to find a set of speakers
where that grate just fell off.

7
00:00:21,450 --> 00:00:25,700
Here are the little speakers,
they are stereo speakers.

8
00:00:25,700 --> 00:00:31,900
The little metal part, the metal coat of
the speaker is 20 millimeters in diameter

9
00:00:31,900 --> 00:00:35,860
and it is surrounded by little flexible
bellow, so it can move in and out,

10
00:00:35,860 --> 00:00:37,520
and that's what makes it a speaker.

11
00:00:37,520 --> 00:00:42,350
Again, this is powered off a USB port on the
computer, so it can make quite a bit of sound.

12

00:00:42,350 --> 00:00:47,500

Since I found this, I thought maybe there is something I can use this for.

13

00:00:47,500 --> 00:00:55,250

Wouldn't it be neat if I could take my MP3 player and run tones through the speakers,

14

00:00:55,250 --> 00:01:03,480

and then I could put a drop of water on here and see what happens to the drop of water

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00:01:03,480 --> 00:01:06,210

without the complications of gravity.

16

00:01:06,210 --> 00:01:13,420

So let's see what is going to what when we look at water with this.

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00:01:13,420 --> 00:01:19,820

So here we have a 30 mm blob of water sphere, hemisphere, sitting on the speaker,

18

00:01:19,820 --> 00:01:22,230

and I am running some tones through it.

19

00:01:22,230 --> 00:01:26,010

I'm sweeping the frequency from around 20 Hz to 30 Hz.

20

00:01:26,010 --> 00:01:28,210

So this is low frequency stuff.

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00:01:28,210 --> 00:01:34,550

Look at these wild oscillations that you could drive into this hemisphere of water.

22

00:01:34,550 --> 00:01:39,730

Depending on the frequency and amplitude you can make anything

23
00:01:39,730 --> 00:01:45,090
from standing ridges to a whole series of lobes.

24
00:01:45,090 --> 00:01:50,390
Now here is a smaller drop of water and it exhibits a different a series

25
00:01:50,390 --> 00:01:53,710
of oscillation modes, similar but different.

26
00:01:53,710 --> 00:01:58,350
It's really amazing to see this and you can see this on a length scale that would be impossible

27
00:01:58,350 --> 00:02:02,540
to see on Earth because gravity would make this just flatten out.

28
00:02:02,540 --> 00:02:06,850
You reach a point where we almost have this chaotic behavior here

29
00:02:06,850 --> 00:02:12,080
where not only does it squirt drops off at the apex, but it just starts to squirt drops off

30
00:02:12,080 --> 00:02:16,230
from all around the hemispherical surface.

31
00:02:19,500 --> 00:02:26,540
Here is that section played back five times slower than the real.

32
00:02:26,540 --> 00:02:29,380
You could see the lobes growing up on the surface.

33

00:02:29,380 --> 00:02:32,600

It almost reminds me of some
kind of a embryo stage

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00:02:32,600 --> 00:02:36,330

of a sea creature trying to
grow tentacles or something.

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00:02:36,330 --> 00:02:42,970

Those lobes start to grow up to the point where
surface tension will neck off a free drop.

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00:02:42,970 --> 00:02:49,680

I am amazed at how much fun you can have
with something as simple as just a little set

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00:02:49,680 --> 00:02:54,560

of speakers from your laptop
computer and a splash of water .

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00:02:54,560 --> 00:03:00,350

Here is another drop, this one is a
bit smaller, and here am starting off

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00:03:00,350 --> 00:03:03,420

at 20 Hz, sweeping up towards 40.

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00:03:03,420 --> 00:03:11,050

This particular drop gets into these,
grows up and down oscillations,

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00:03:11,050 --> 00:03:15,020

and starts to eject droplets right at the apex.

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00:03:15,020 --> 00:03:19,420

But the most amazing thing
happens, it actually makes a cavity,

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00:03:19,420 --> 00:03:24,150

and that cavity gets pinched off
and it makes air bubbles inside.

44

00:03:24,150 --> 00:03:26,540

Now here is a is a small, smaller drop.

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00:03:26,540 --> 00:03:29,130

Look at what this drop does.