



VOICE OF

Mark Weislogel

Principal Investigator, Capillary Flow Experiments - 2

1

00:00:02,536 --> 00:00:06,616

>> This is Mission Control Houston, again,
we're getting ready to do an interview

2

00:00:06,616 --> 00:00:10,386

with Mark Weislogel, of the
Portland, Oregon State University.

3

00:00:10,386 --> 00:00:14,736

Mark is the Principal Investigator for
the Capillary Flow, Flow Experiment.

4

00:00:14,736 --> 00:00:16,556

Welcome to Mission Control, Mark.

5

00:00:16,786 --> 00:00:17,766

>> How you doing?

6

00:00:18,476 --> 00:00:19,276

>> Doing great.

7

00:00:19,496 --> 00:00:23,846

Hey, we know that you're the Principal
Investigator for Capillary Flow Experiments 2,

8

00:00:24,306 --> 00:00:26,606

could you tell us a little
bit about the experiment?

9

00:00:27,506 --> 00:00:33,356

>> Yeah. These experiments are set to try
to understand some complicated interaction

10

00:00:33,356 --> 00:00:38,956

between how liquids behave when gravity
is gone in funny shaped containers.

11

00:00:39,376 --> 00:00:47,146

So what we're trying to do is, is exploit how

surface tension and wetting affects combined

12
00:00:47,146 --> 00:00:52,066
with a strange geometry to make the liquid
go where, where we want to in that container.

13
00:00:52,176 --> 00:00:57,436
So without centrifuges or without thruster
firings, without any manipulation or anything,

14
00:00:57,756 --> 00:01:02,126
we can passively control where the liquid is in
the container and maybe you can understand how

15
00:01:02,126 --> 00:01:06,236
that might be important when gravity is gone
so that when you actually go to get the liquid

16
00:01:06,236 --> 00:01:09,096
out of the container, you can do
that, 'cause you know where it is.

17
00:01:09,096 --> 00:01:12,676
And the same thing is when you want to get
the gas out, you know where that is too,

18
00:01:12,676 --> 00:01:14,286
so, so that's our, that's our aim.

19
00:01:15,296 --> 00:01:18,466
>> And so what kind of activities
are going on with CFE this week?

20
00:01:18,766 --> 00:01:23,656
>> Okay. We have, I believe Don Pettit
is going to be doing some runs for us,

21
00:01:23,656 --> 00:01:30,356
looking for what we call these magic wetting
conditions where we, we, we change the juncture

22

00:01:30,356 --> 00:01:35,756

by rotating a vein inside a, a elliptical container and at certain angles,

23

00:01:36,106 --> 00:01:41,386

fluid will wick up certain passageways and change its orientation.

24

00:01:41,386 --> 00:01:46,796

And by doing that, we can develop the mass skills to predict this behavior.

25

00:01:46,956 --> 00:01:53,956

So we could design a tank that could actually exploit a, like, like I said before,

26

00:01:53,956 --> 00:01:56,516

this shape to get the liquid to all go one direction.

27

00:01:57,626 --> 00:02:03,236

>> And correct me if I'm wrong, but I think Don Pettit actually had some fun with this affect

28

00:02:03,236 --> 00:02:09,946

after we installed and activated the water recycling system on board the space station.

29

00:02:09,946 --> 00:02:14,106

He designed a zero gravity cup that they could do a toast with.

30

00:02:14,226 --> 00:02:17,036

>> Yes. In fact we had something to do with that too.

31

00:02:17,036 --> 00:02:22,956

We, we -- it in fact that cup exploits a similar kind of concept to what we're talking about is

32

00:02:22,956 --> 00:02:28,596

where this fluid wicks up an interior corner
in that container and then you can draw

33

00:02:29,136 --> 00:02:33,876

from that corner just as if you were
drinking on earth and the wetting

34

00:02:33,876 --> 00:02:37,716

and surface tension affects perform
the same function as gravity on earth.

35

00:02:37,716 --> 00:02:42,506

So it looks and feels somewhat similar
to drinking on the ground instead of,

36

00:02:42,506 --> 00:02:47,216

instead of sucking from a bag, which is what I
think after a while might feel a little funny.

37

00:02:47,306 --> 00:02:51,476

>> Yeah. So, what exactly
in terms, what does micro --

38

00:02:51,476 --> 00:02:54,246

how does microgravity make
your experiment possible?

39

00:02:55,106 --> 00:03:00,356

>> Okay. So, when gravity is gone, what
we normally see in capillary affects

40

00:03:00,356 --> 00:03:05,876

and small tubes and sponges, you can see an
enormous systems, enormous sponges, you know,

41

00:03:05,876 --> 00:03:09,476

with, with pore sizes on the
size of a meter or something.

42

00:03:09,476 --> 00:03:13,156

So, you see capillary phenomenon
like you would never see on earth,

43

00:03:13,716 --> 00:03:18,476

what that does is it gives us great control
over what the shape of the container is.

44

00:03:18,476 --> 00:03:26,126

We can build basically, you know, complex
systems that we know what the shapes are very,

45

00:03:26,126 --> 00:03:31,716

very well and so we can -- our science
there has much greater control compared

46

00:03:31,716 --> 00:03:32,936

to what we can do on the ground.

47

00:03:33,486 --> 00:03:36,186

It also has special application
in space and we're

48

00:03:36,186 --> 00:03:39,606

in fluid regimes that we can't get to on earth.

49

00:03:39,606 --> 00:03:46,756

So, not only is, is it easier to study in
space, but the applications are in space too,

50

00:03:46,756 --> 00:03:51,156

so our confidence goes way up for the things
that we discover there that we also want

51

00:03:51,156 --> 00:03:54,236

to use there, like for space
craft systems design.

52

00:03:55,146 --> 00:04:00,396

>> How can we apply your research results to benefit people here on earth?

53

00:04:00,396 --> 00:04:04,766

>> Okay. That, that's happening just recently, we find that some of the,

54

00:04:04,766 --> 00:04:07,556

the rules and design tools that we are developing

55

00:04:07,556 --> 00:04:12,366

for the space applications are also things we can design for, for ground use.

56

00:04:12,366 --> 00:04:17,026

For instance, for what we call lab on chip technologies where you have a precious,

57

00:04:17,446 --> 00:04:22,536

small liquid sample, like a blood sample or a, you know, whether it's an AIDs patients

58

00:04:22,536 --> 00:04:26,716

or whether it's some, some other, other [inaudible] those reagents,

59

00:04:26,716 --> 00:04:30,926

or those samples can go down on a chip, spread out by these capillary flow methods

60

00:04:30,926 --> 00:04:35,276

and be analyzed and so we've actually consulted on a couple projects related to that.

61

00:04:35,436 --> 00:04:38,556

And they're very easy for us because of, of what has been developed

62

00:04:38,556 --> 00:04:41,246
from the, from the space experiments.

63
00:04:42,016 --> 00:04:43,916
>> So it's all about the math, huh?

64
00:04:43,956 --> 00:04:48,336
>> I'm sorry to say, yes and we're
delighted by that, maybe not everybody is.

65
00:04:48,546 --> 00:04:52,886
But in the end, what comes out of our
work is an equation and that can be used

66
00:04:52,886 --> 00:04:58,596
to very efficiently and very effectively either
design, design systems and improve processes.

67
00:04:59,516 --> 00:05:05,936
[Background noise]

68
00:05:06,436 --> 00:05:10,426
>> And so, Mark, what's your background,
where are you from, where'd you go to school,

69
00:05:10,566 --> 00:05:12,746
what's your lab like where you work now?

70
00:05:12,966 --> 00:05:16,286
>> Okay. Well, I'm from Portland
State University and I arrived,

71
00:05:16,576 --> 00:05:21,656
I arrived here via Industry Research
in Colorado and from there before,

72
00:05:21,656 --> 00:05:24,426
actually 10 years working at
NASA Glenn Research Center.

73

00:05:24,926 --> 00:05:29,396

And that was straight out of school
and a PhD at Northwestern University.

74

00:05:29,766 --> 00:05:34,366

Before that even, I was, you know,
moving from, from state to state,

75

00:05:34,636 --> 00:05:38,566

but I actually spent some time in
Oregon, too, before so I'm kind of back

76

00:05:38,566 --> 00:05:40,316

to a place where I went to high school.

77

00:05:40,536 --> 00:05:45,456

It's a great place to be, there's no
NASA center in the, in the vicinity,

78

00:05:45,536 --> 00:05:49,506

so folks around are interested definitely
to, to be involved in NASA work.

79

00:05:49,506 --> 00:05:54,716

And some of our students have had just wonderful
opportunities to be part of this research.

80

00:05:55,676 --> 00:06:00,226

>> Well, you know, if the recent application
process is any sign, a lot of folks want

81

00:06:00,226 --> 00:06:03,946

to be astronauts, but there's a lot
of other opportunities for people

82

00:06:03,946 --> 00:06:06,736

to get involved in space and space research.

83

00:06:06,736 --> 00:06:09,686

Do you have any advice for students or young people

84
00:06:09,686 --> 00:06:10,966
who might want to get into your line of work?

85
00:06:11,266 --> 00:06:14,536
>> Okay. If you -- if they're interested, they don't know --

86
00:06:14,706 --> 00:06:17,776
a lot of students don't know how accessible a lot of these faculty

87
00:06:17,776 --> 00:06:23,956
who are already involved are and I think just any professor would love to meet students

88
00:06:23,956 --> 00:06:26,726
who are highly motivated and interested and have --

89
00:06:26,726 --> 00:06:30,756
show signs, you know, tangible signs of that interest.

90
00:06:30,876 --> 00:06:35,566
And the students that we have involved, they're training astronauts.

91
00:06:35,616 --> 00:06:39,886
They're, they're involved in crew procedures, they've even been enabled in space to ground

92
00:06:39,886 --> 00:06:41,886
to speak to the astronaut during the experiment.

93
00:06:41,886 --> 00:06:44,656
Don Pettit and, and Dan Burbank have both request this,

94

00:06:45,056 --> 00:06:48,296

this is just terrific, it's very exciting.

95

00:06:48,296 --> 00:06:50,096

How do they tell their folks
that they're doing this?

96

00:06:50,566 --> 00:06:52,786

It's just, it's just wonderful.

97

00:06:52,786 --> 00:06:57,236

And then of course the science that they're
gathering is, is, you know, being published and,

98

00:06:57,236 --> 00:07:00,526

and sending those students on their ways
and their career in just wonderful ways.

99

00:07:00,526 --> 00:07:07,046

So, so I would just recommend that they get
pretty aggressive in identifying the work --

100

00:07:07,736 --> 00:07:11,766

where the work is going on that they're
interested in doing and then go for that.

101

00:07:11,766 --> 00:07:14,476

People love to find people who
are excited about what they do.

102

00:07:16,056 --> 00:07:17,886

>> Well, Mark, thanks for being with us.

103

00:07:17,886 --> 00:07:20,556

One last question for you, it's
a nice day here in Houston,

104

00:07:20,556 --> 00:07:21,946

although it started out a little bit foggy.

105

00:07:22,346 --> 00:07:26,366

Are you seeing any signs of your science at work in Portland?

106

00:07:26,366 --> 00:07:29,266

We all hear it tends to be a little bit damp there.

107

00:07:29,266 --> 00:07:32,796

Are the -- are you seeing any surface tension on your windows today?

108

00:07:33,476 --> 00:07:34,276

>> Every day.

109

00:07:34,756 --> 00:07:39,726

We have looked for images from space of Portland for days and days, but have never seen it 'cause

110

00:07:39,726 --> 00:07:42,626

of the clouds, but that's what we deal with.

111

00:07:42,706 --> 00:07:43,106

>> All right.

112

00:07:43,106 --> 00:07:46,416

Again, thank you very much, Mark Weislogel, the Principal Investigator

113

00:07:46,466 --> 00:07:49,846

for the Capillary Flow Experiment 2, for being with us today.