



**NASTRAN Modal Animation
ISS Loads and Dynamics
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default_Deformation :
Max 3.65001 @Nd 40106
Frame: 15
Scale = -0.78001

1
00:00:09,610 --> 00:00:06,280
we've all heard the term of phrase

2
00:00:11,199 --> 00:00:09,620
flexing your muscles but probably not

3
00:00:13,480 --> 00:00:11,209
consider that the International Space

4
00:00:17,589 --> 00:00:13,490
Station is constantly flexing its

5
00:00:20,800 --> 00:00:17,599
muscles in a way it does wiggle and move

6
00:00:22,960 --> 00:00:20,810
as well as orbit in a straight line and

7
00:00:24,700 --> 00:00:22,970
knowing that this occurs has an

8
00:00:26,640 --> 00:00:24,710
important effect on the design of

9
00:00:28,659 --> 00:00:26,650
experiments that are going on inside

10
00:00:31,540 --> 00:00:28,669
important question though is how do you

11
00:00:33,369 --> 00:00:31,550
measure that movement nasa commentator

12
00:00:35,470 --> 00:00:33,379
Lori Meggs at the Marshall Space Flight

13
00:00:37,840 --> 00:00:35,480

Center caught up with the principal

14

00:00:39,340 --> 00:00:37,850
engineer for an experiment that has been

15

00:00:42,670 --> 00:00:39,350
measuring the movements of the space

16

00:00:44,080 --> 00:00:42,680
station since 2012 this particular

17

00:00:45,610 --> 00:00:44,090
experiment that we're running here than

18

00:00:49,630 --> 00:00:45,620
the flexure experiment really is

19

00:00:51,939 --> 00:00:49,640
designed to capture information about

20

00:00:53,650 --> 00:00:51,949
the motion of the wiggle and the flexing

21

00:00:55,420 --> 00:00:53,660
in the station that is known to occur at

22

00:00:56,979 --> 00:00:55,430
these locations but something that's not

23

00:00:59,590 --> 00:00:56,989
readily available because the sensors

24

00:01:01,479 --> 00:00:59,600
that can measure this are not always

25

00:01:03,099 --> 00:01:01,489
activated or there may not actually be

26

00:01:05,229 --> 00:01:03,109

sensors in the vicinity where we're

27

00:01:07,630 --> 00:01:05,239

operating and we're located very high in

28

00:01:09,820 --> 00:01:07,640

the station and the the ability to

29

00:01:11,590 --> 00:01:09,830

measure the the flexing motion something

30

00:01:14,020 --> 00:01:11,600

would be very useful to other

31

00:01:16,450 --> 00:01:14,030

experimenters that may have payloads

32

00:01:18,490 --> 00:01:16,460

that may actually be birth near us so

33

00:01:20,499 --> 00:01:18,500

that's really what we're trying to do or

34

00:01:22,510 --> 00:01:20,509

we're utilizing the antenna in ways not

35

00:01:24,760 --> 00:01:22,520

initially designed to be able to capture

36

00:01:26,950 --> 00:01:24,770

this data what does this flexure we're

37

00:01:28,569 --> 00:01:26,960

talking about simplest analogy be you

38

00:01:30,490 --> 00:01:28,579

know driving a minivan with your kids in

39

00:01:32,200 --> 00:01:30,500

the backseat and they push off the walls

40

00:01:33,370 --> 00:01:32,210

or they bounce around you actually feel

41

00:01:34,749 --> 00:01:33,380

that wiggle in the car and that's

42

00:01:35,950 --> 00:01:34,759

exactly what happens you know when the

43

00:01:38,950 --> 00:01:35,960

crew is activated and they're not

44

00:01:40,480 --> 00:01:38,960

sleeping they push off from the various

45

00:01:41,679 --> 00:01:40,490

modules to locomote themselves

46

00:01:43,510 --> 00:01:41,689

throughout the structure and so when

47

00:01:45,999 --> 00:01:43,520

they do that push off because space

48

00:01:48,100 --> 00:01:46,009

station is so very large starts exciting

49

00:01:49,840 --> 00:01:48,110

what we call these vibratory modes and

50

00:01:52,300 --> 00:01:49,850

the system basically flexes and moves

51
00:01:54,969 --> 00:01:52,310
and you'll start to see scissoring

52
00:01:56,590 --> 00:01:54,979
motions so you have this large 100 meter

53
00:01:59,109 --> 00:01:56,600
structure which is starting to scissor

54
00:02:00,789 --> 00:01:59,119
and twist and do all these bendings and

55
00:02:02,709 --> 00:02:00,799
that those sorts of things can play

56
00:02:04,899 --> 00:02:02,719
havoc with pointing experiments that may

57
00:02:07,120 --> 00:02:04,909
be located on these truss structure so

58
00:02:09,469 --> 00:02:07,130
we say flexure I'm talking about sort of

59
00:02:11,920 --> 00:02:09,479
this twisting motion that me

60
00:02:15,080 --> 00:02:11,930
out in the far reaches of the station

61
00:02:17,270 --> 00:02:15,090
how can it be used on earth and in space

62
00:02:17,690 --> 00:02:17,280
how can the information that you learn

63
00:02:18,890 --> 00:02:17,700

from this

64

00:02:21,259 --> 00:02:18,900

well I think you know we're really

65

00:02:25,039 --> 00:02:21,269

trying to supply a piece of information

66

00:02:26,390 --> 00:02:25,049

for future experimenters and most of the

67

00:02:28,580 --> 00:02:26,400

flexing that we're trying to measure

68

00:02:31,369 --> 00:02:28,590

obviously no one exists quantities the

69

00:02:33,410 --> 00:02:31,379

frequencies are useful for optical

70

00:02:34,820 --> 00:02:33,420

communications experiments these

71

00:02:36,800 --> 00:02:34,830

experiments require really high

72

00:02:39,229 --> 00:02:36,810

precision pointing and in order to

73

00:02:40,490 --> 00:02:39,239

stress their systems to be able to

74

00:02:41,600 --> 00:02:40,500

understand if they'll actually work they

75

00:02:43,970 --> 00:02:41,610

need to be able to understand what these

76

00:02:45,380 --> 00:02:43,980

flexures are and so it's important to

77

00:02:46,880 --> 00:02:45,390

have an understanding of what the

78

00:02:48,619 --> 00:02:46,890

magnitude of this is you can kind of

79

00:02:51,680 --> 00:02:48,629

prepare the experiment prior to it being

80

00:02:53,479 --> 00:02:51,690

launched prior to it being flown so I

81

00:02:55,550 --> 00:02:53,489

think what we're trying to do is provide

82

00:02:57,199 --> 00:02:55,560

useful data for future experiment or

83

00:03:00,680 --> 00:02:57,209

switching a little intern benefit and

84

00:03:03,140 --> 00:03:00,690

longer in a longer duration longer

85

00:03:05,059 --> 00:03:03,150

timeline activities for instance optical

86

00:03:06,890 --> 00:03:05,069

communications for deep-space pointing

87

00:03:08,240 --> 00:03:06,900

and things of that nature how long have

88

00:03:08,839 --> 00:03:08,250

you been on this station and how long

89

00:03:11,750 --> 00:03:08,849

will this go on

90

00:03:14,479 --> 00:03:11,760

well we've been running since 2012 you

91

00:03:17,690 --> 00:03:14,489

know we launched in August transited and

92

00:03:19,190 --> 00:03:17,700

then were birthed and began and started

93

00:03:21,080 --> 00:03:19,200

our commissioning activities in August

94

00:03:23,930 --> 00:03:21,090

of 2012 and we've been operating ever

95

00:03:26,180 --> 00:03:23,940

since we've been basically a continuous

96

00:03:27,740 --> 00:03:26,190

shift of operations of an Operations

97

00:03:29,960 --> 00:03:27,750

team and we've been supporting and will

98

00:03:31,670 --> 00:03:29,970

probably continue for several years to

99

00:03:33,979 --> 00:03:31,680

come you know with new directives from

100

00:03:38,089 --> 00:03:33,989

the scan program office what have you

101
00:03:39,409 --> 00:03:38,099
learned so far well that's that's that

102
00:03:41,720 --> 00:03:39,419
would take probably more than this

103
00:03:43,300 --> 00:03:41,730
interview to conduct that specifically

104
00:03:45,229 --> 00:03:43,310
for our tests here you know we really

105
00:03:47,270 --> 00:03:45,239
you know when we first ran this

106
00:03:48,949 --> 00:03:47,280
experiment is very difficult to extract

107
00:03:51,259 --> 00:03:48,959
this data and make sense of it but we've

108
00:03:53,509 --> 00:03:51,269
really we've really refined that and and

109
00:03:55,789 --> 00:03:53,519
we now have a very good sense of we can

110
00:03:57,170 --> 00:03:55,799
actually use this this ka-band antennae

111
00:03:59,150 --> 00:03:57,180
not originally designed to do what it is

112
00:04:00,770 --> 00:03:59,160
being used for to actually conduct these

113
00:04:02,690 --> 00:04:00,780

types of experiments to actually get

114

00:04:04,250 --> 00:04:02,700

this flexure and we're supporting other

115

00:04:05,920 --> 00:04:04,260

activities one of them as a discrete

116

00:04:08,479 --> 00:04:05,930

thruster firing tests and we hope to

117

00:04:09,890 --> 00:04:08,489

activate our payload to be able to

118

00:04:11,750 --> 00:04:09,900

capture that information as well

119

00:04:15,319 --> 00:04:11,760

something that again we have originally

120

00:04:18,449 --> 00:04:15,329

intended to do but something that we can

121

00:04:21,509 --> 00:04:18,459

the engineers normally will track a data

122

00:04:24,240 --> 00:04:21,519

satellite with a ka-band antenna but

123

00:04:26,820 --> 00:04:24,250

this team has explored using the Sun as

124

00:04:28,320 --> 00:04:26,830

a radio source for ka-band tracking

125

00:04:30,750 --> 00:04:28,330

which makes it a unique

126

00:04:33,629 --> 00:04:30,760

first-of-its-kind experiment and it's