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At 20 seconds, damper 1 opens

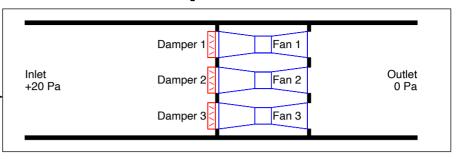
At 40 seconds, fan 1 starts

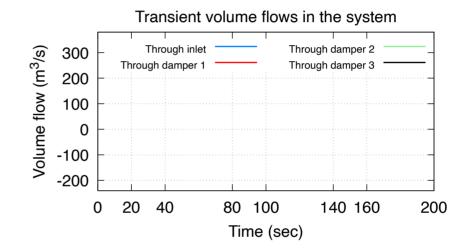
At 80 seconds, damper 2 opens

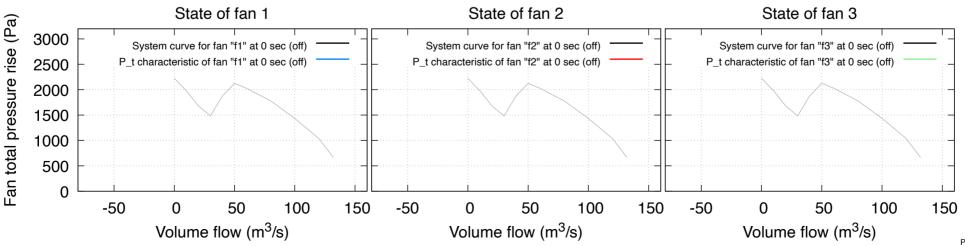
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

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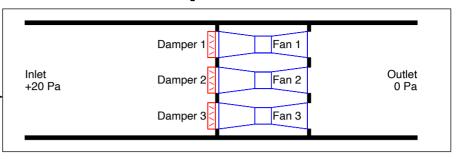
At 40 seconds, fan 1 starts

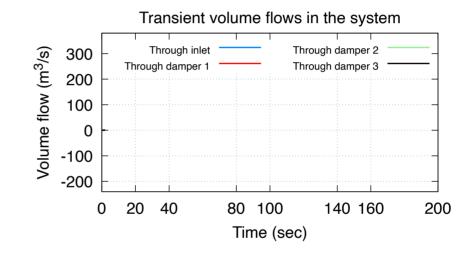
At 80 seconds, damper 2 opens

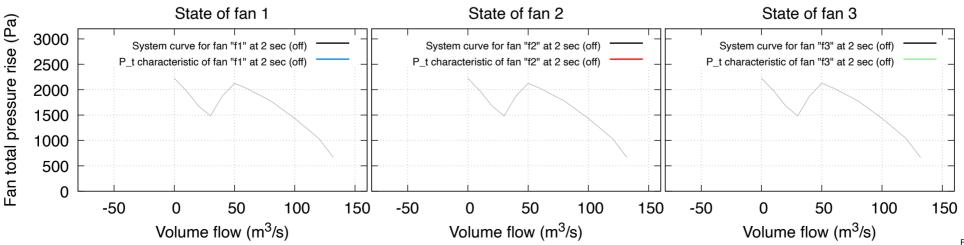
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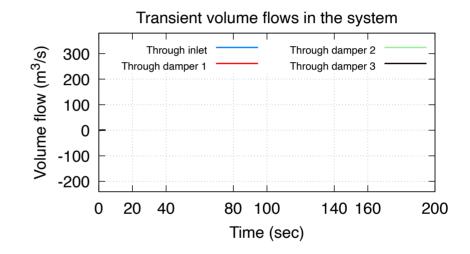
At 80 seconds, damper 2 opens

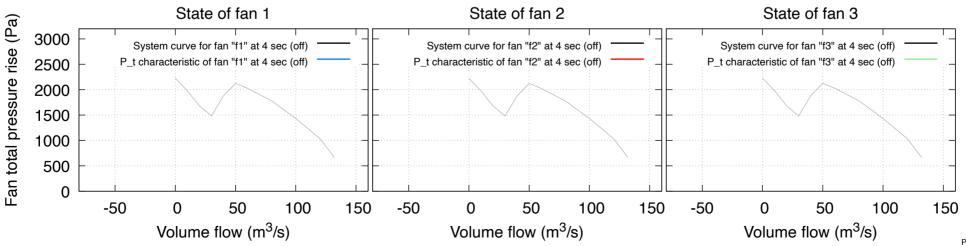
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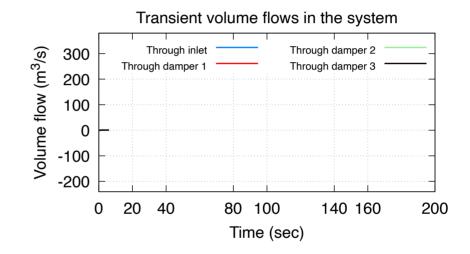
At 80 seconds, damper 2 opens

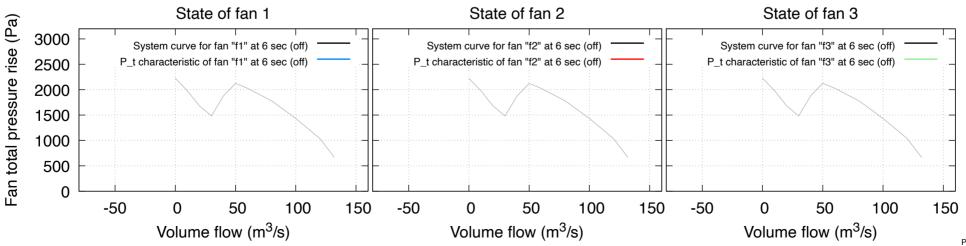
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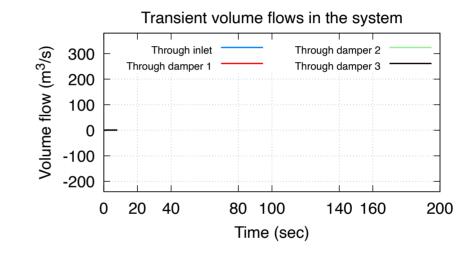
At 80 seconds, damper 2 opens

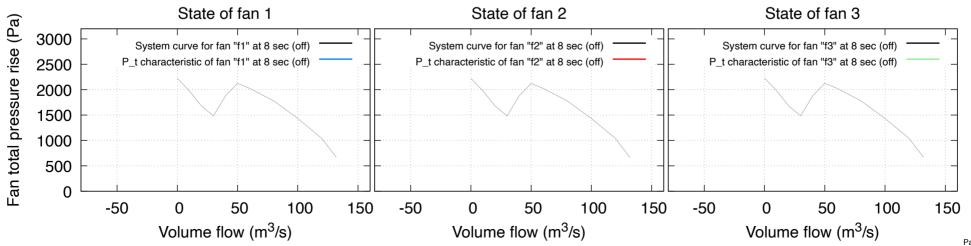
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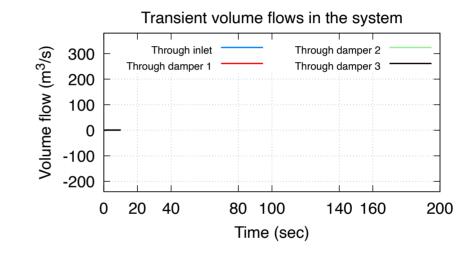
At 80 seconds, damper 2 opens

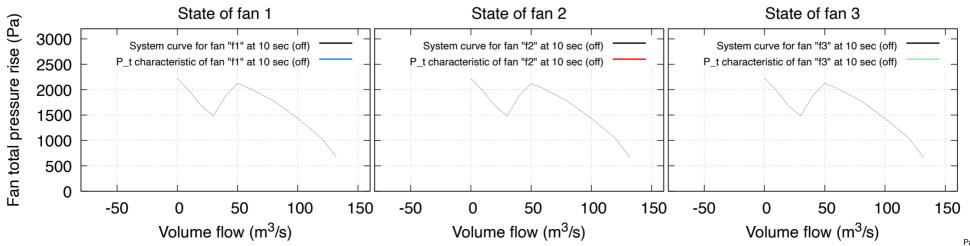
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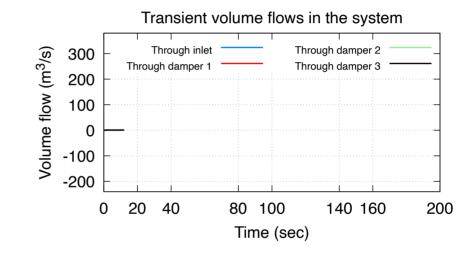
At 80 seconds, damper 2 opens

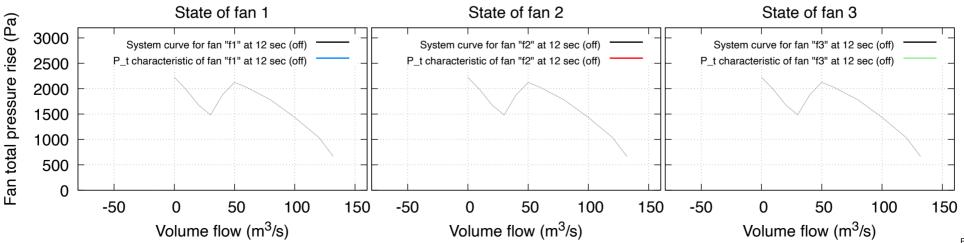
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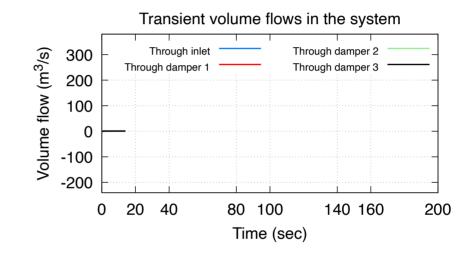
At 80 seconds, damper 2 opens

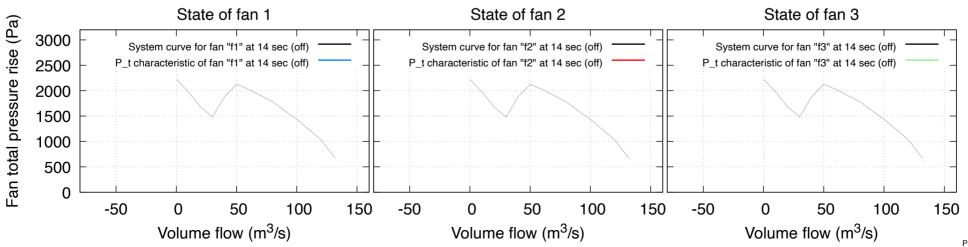
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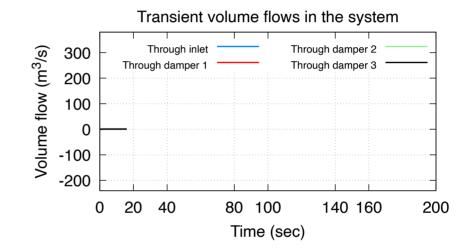
At 80 seconds, damper 2 opens

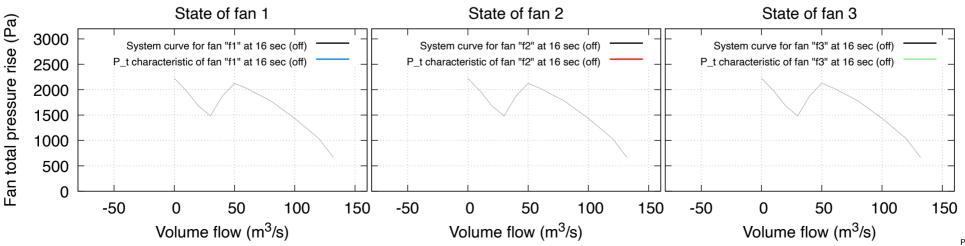
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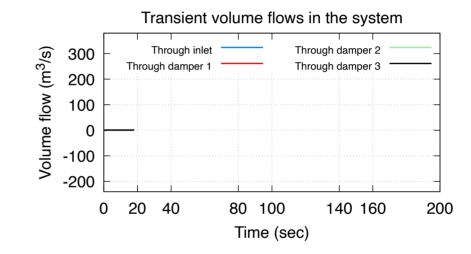
At 80 seconds, damper 2 opens

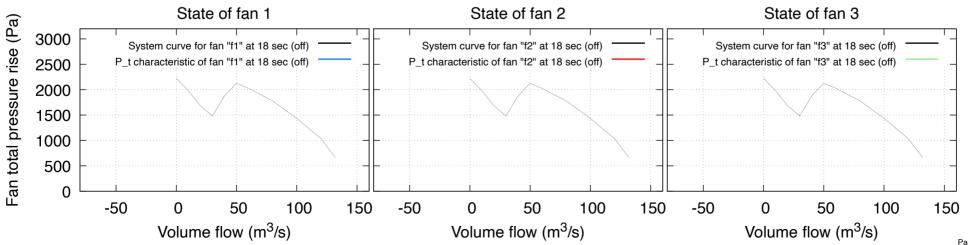
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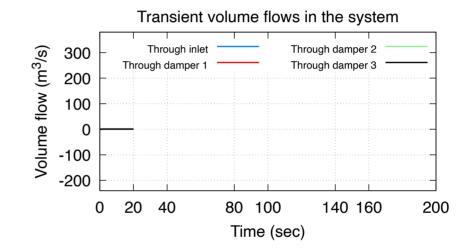
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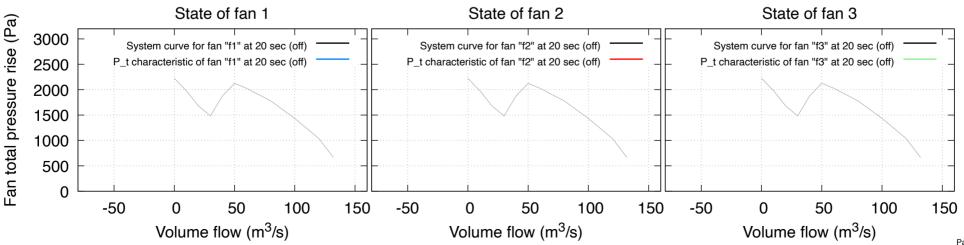
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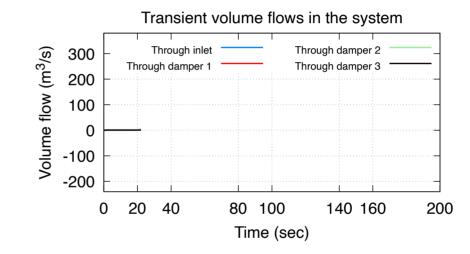
At 80 seconds, damper 2 opens

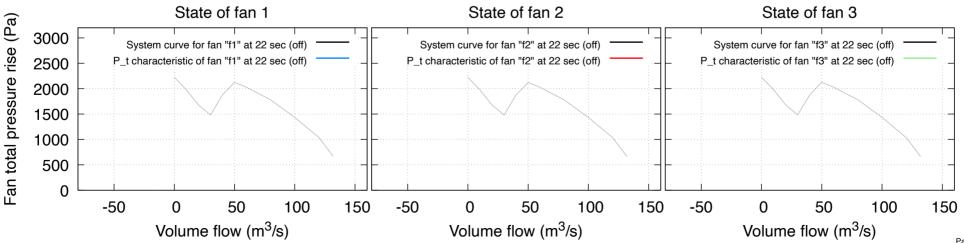
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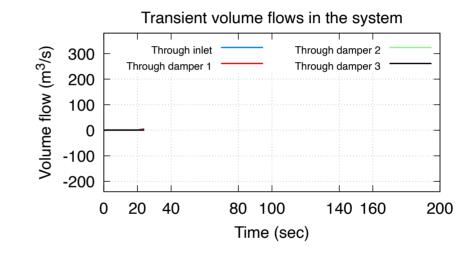
At 80 seconds, damper 2 opens

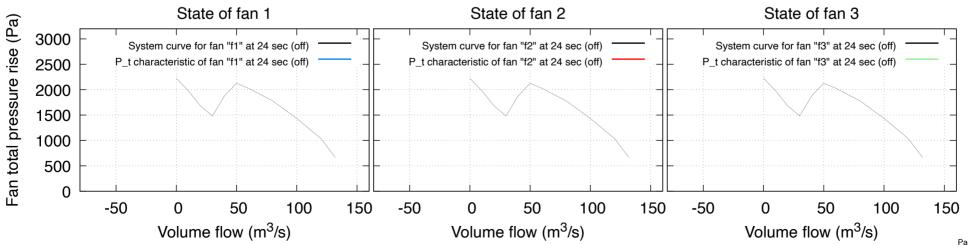
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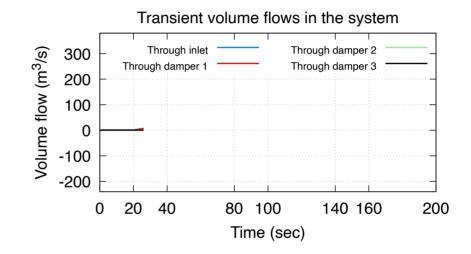
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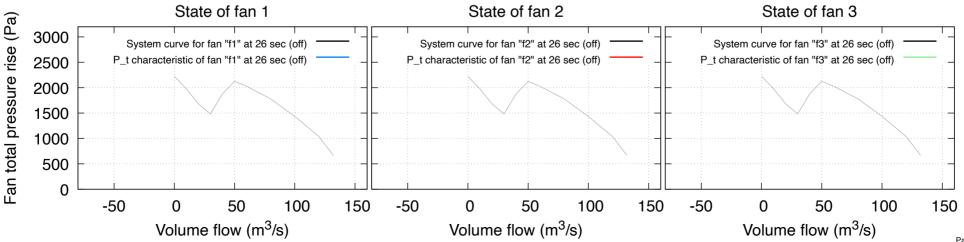
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Source file: ok-032-fans-in-parallel.txt.



Page 14

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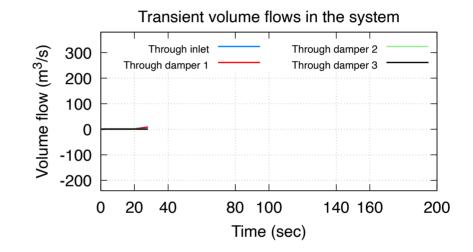
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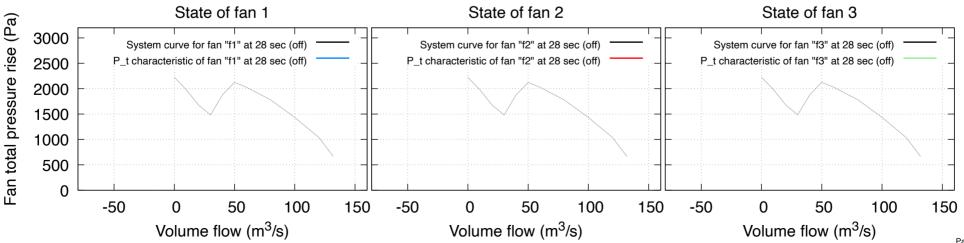
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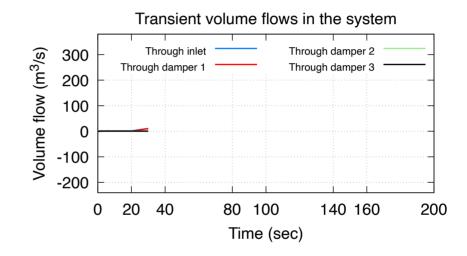
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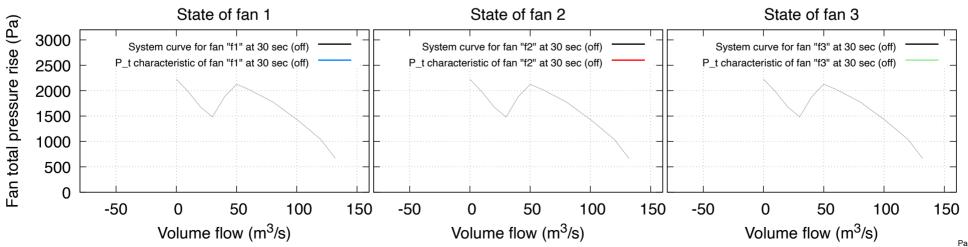
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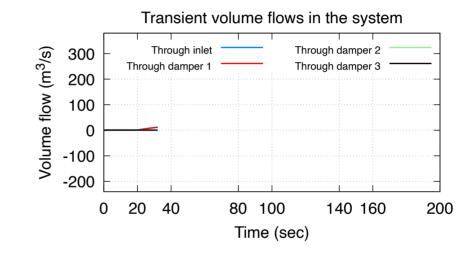
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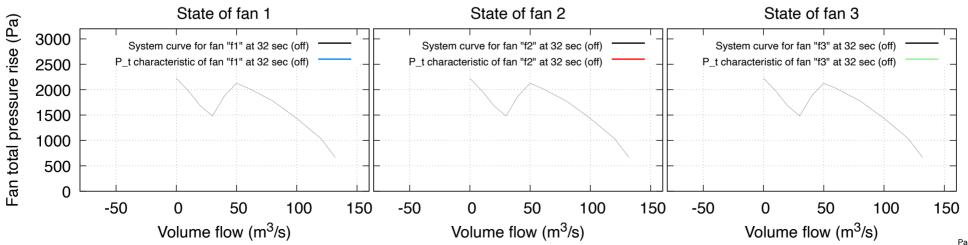
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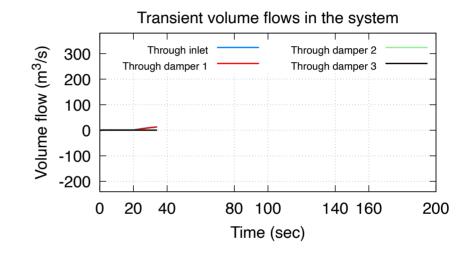
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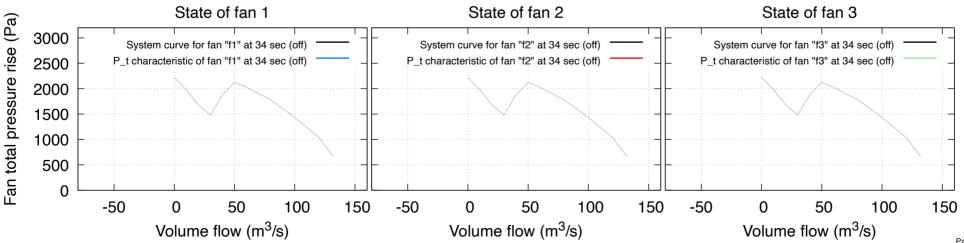
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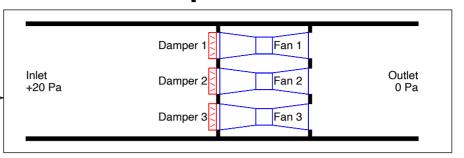
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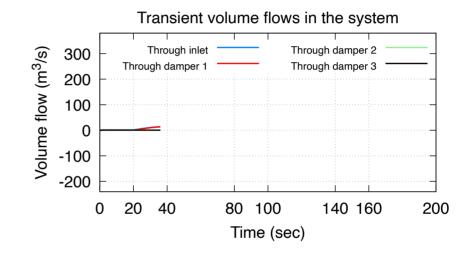
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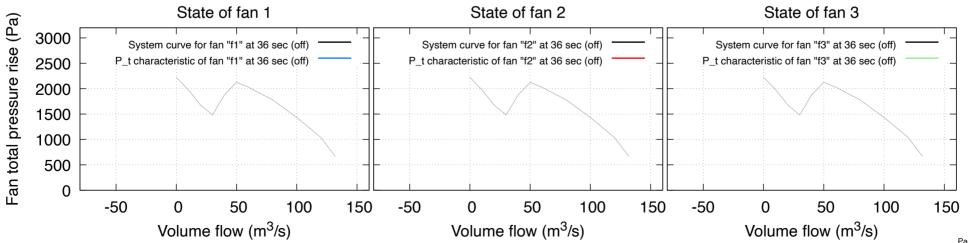
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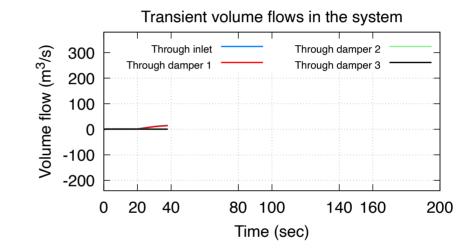
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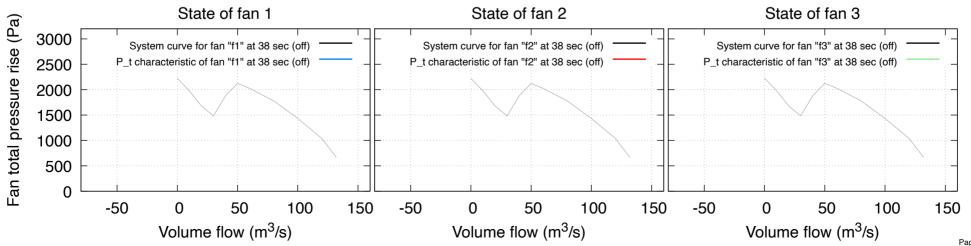
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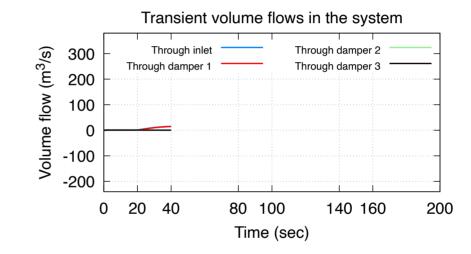
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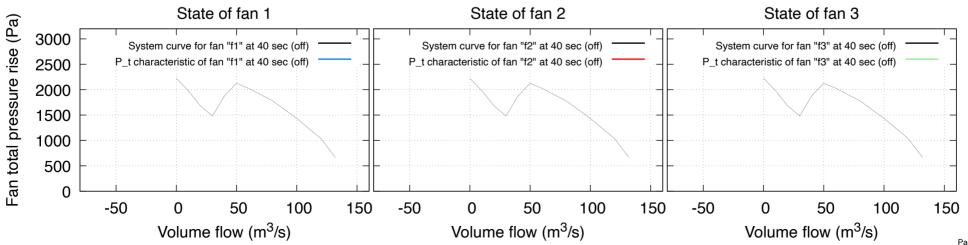
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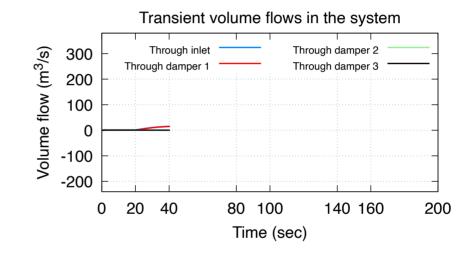
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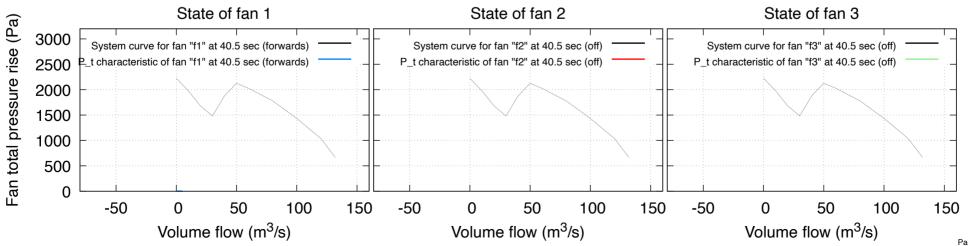
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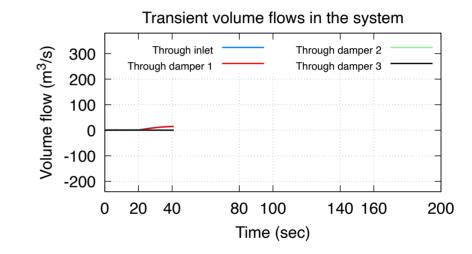
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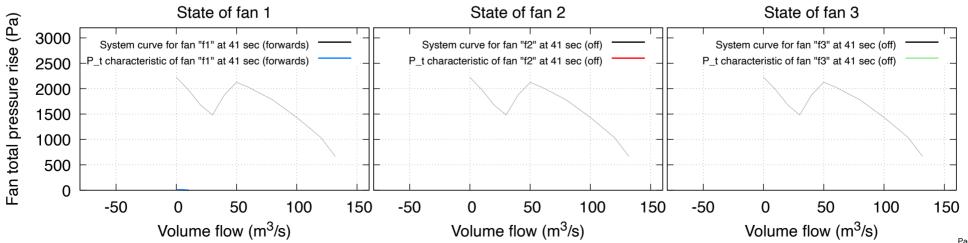
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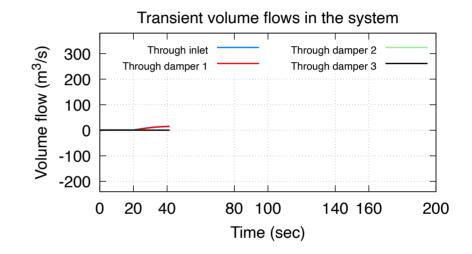
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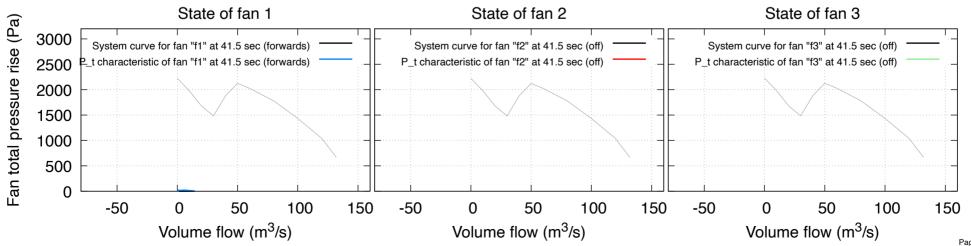
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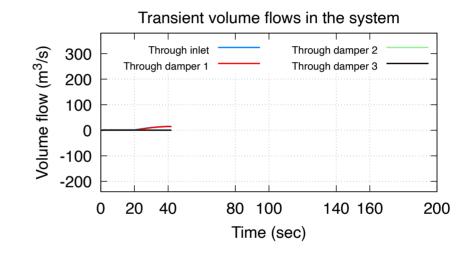
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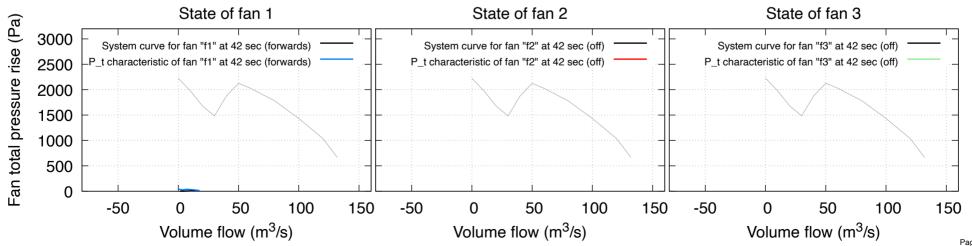
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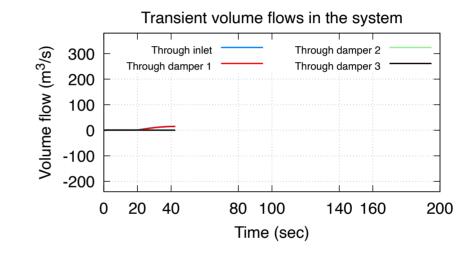
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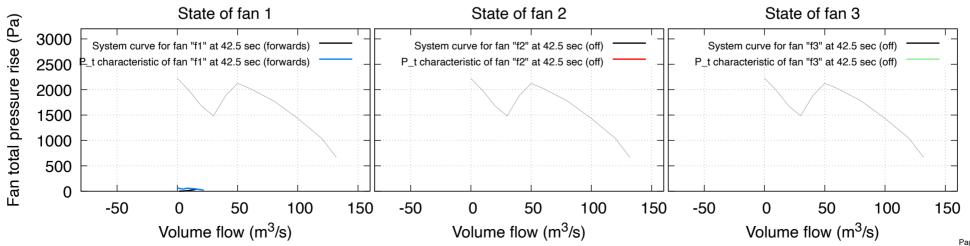
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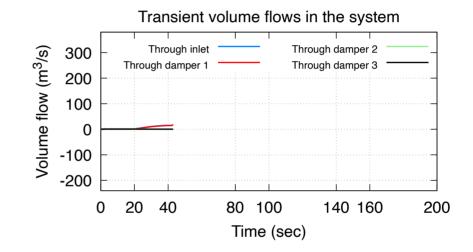
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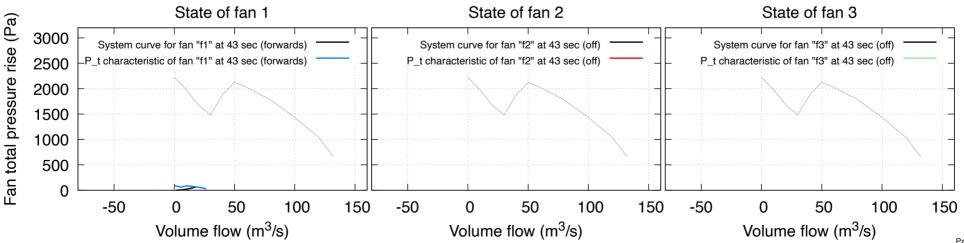
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At 20 seconds, damper 1 opens

At 40 seconds, fan 1 starts

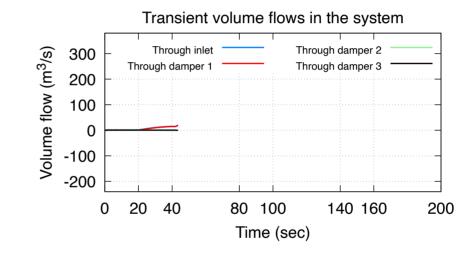
At 80 seconds, damper 2 opens

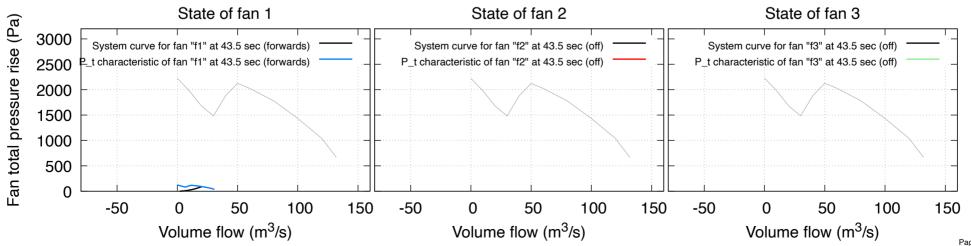
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

At 160 seconds, fan 3 starts







Source file: ok-032-fans-in-parallel.txt.



Created by Hobyah.py from ok-032-fans-in-parallel.txt, 19:30 on 22 Jul 2024 by ecb

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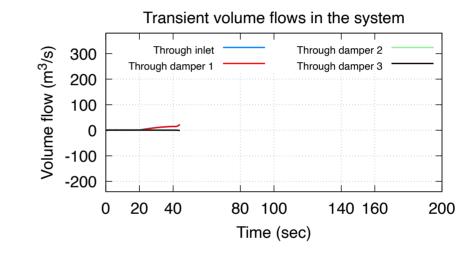
At 80 seconds, damper 2 opens

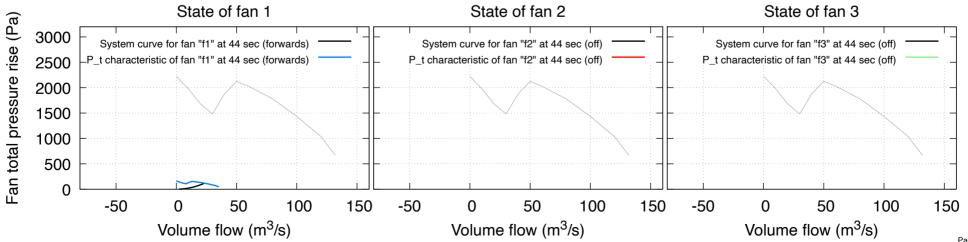
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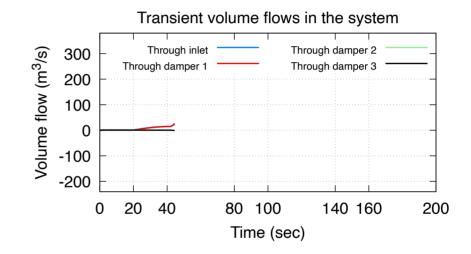
At 80 seconds, damper 2 opens

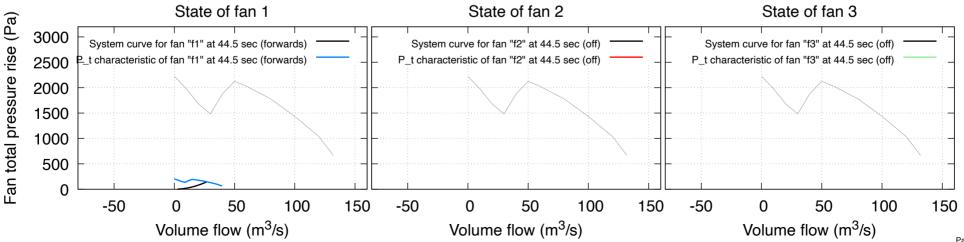
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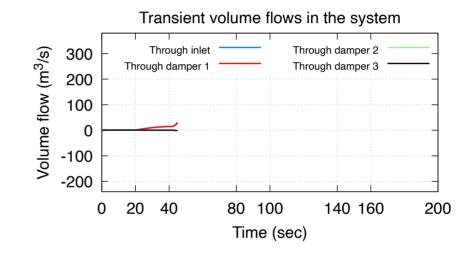
At 80 seconds, damper 2 opens

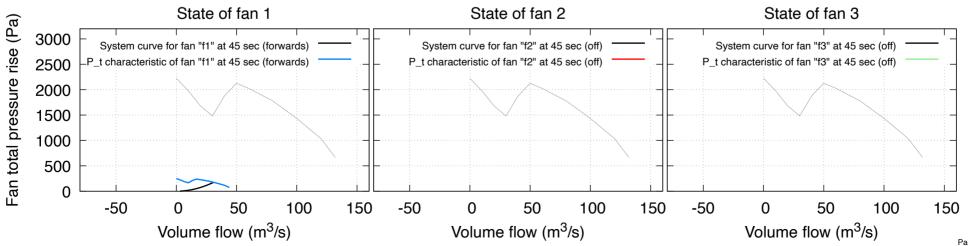
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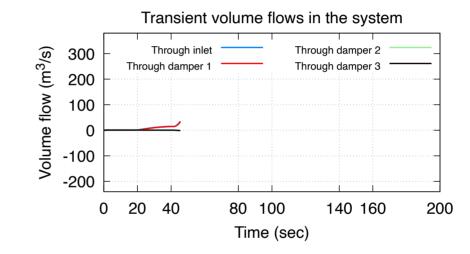
At 80 seconds, damper 2 opens

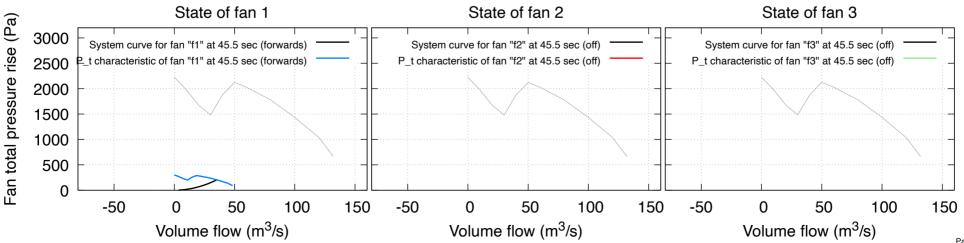
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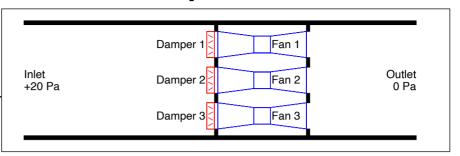
At 40 seconds, fan 1 starts

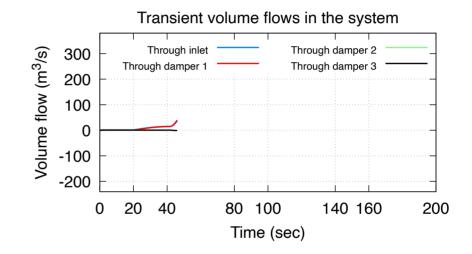
At 80 seconds, damper 2 opens

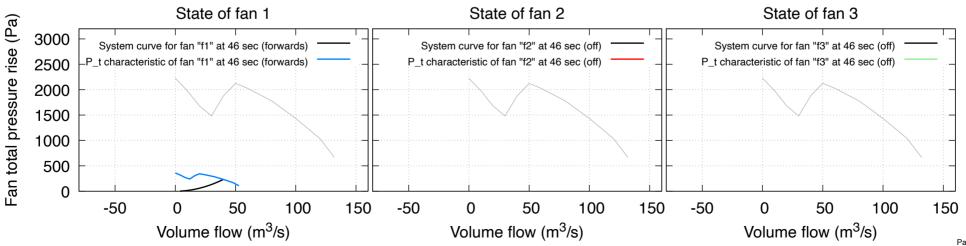
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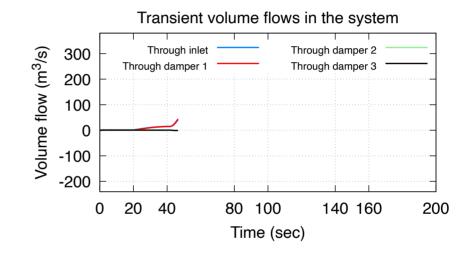
At 80 seconds, damper 2 opens

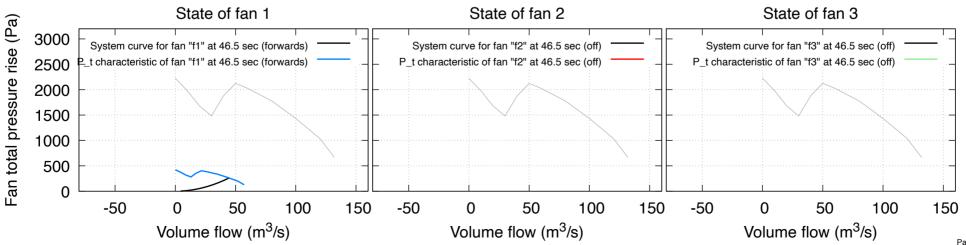
At 100 seconds, fan 2 starts

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Source file: ok-032-fans-in-parallel.txt.



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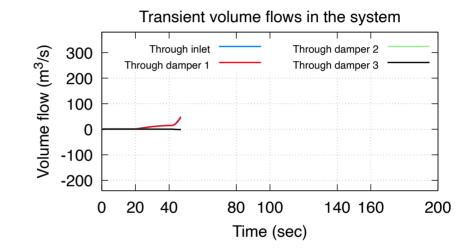
At 80 seconds, damper 2 opens

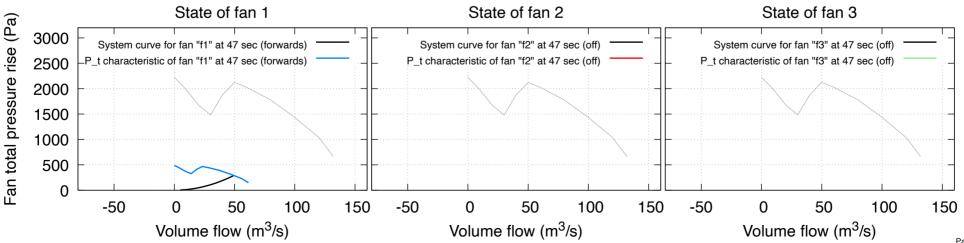
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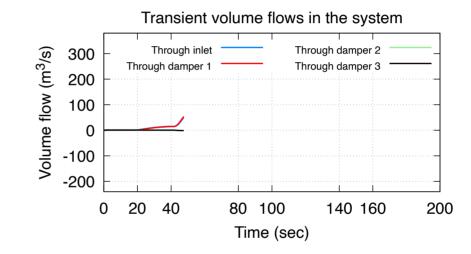
At 80 seconds, damper 2 opens

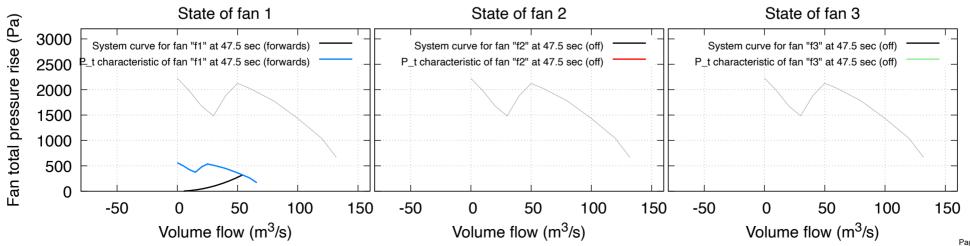
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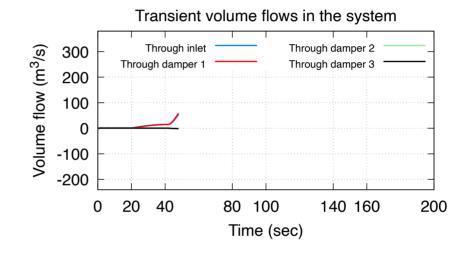
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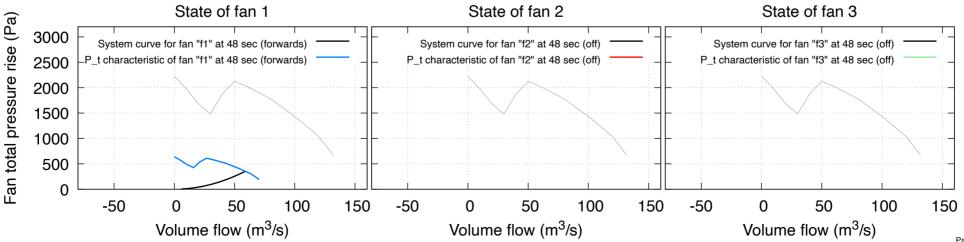
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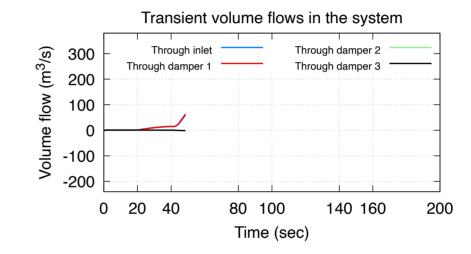
At 80 seconds, damper 2 opens

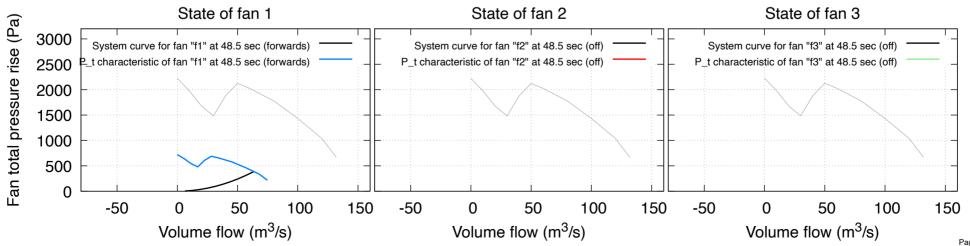
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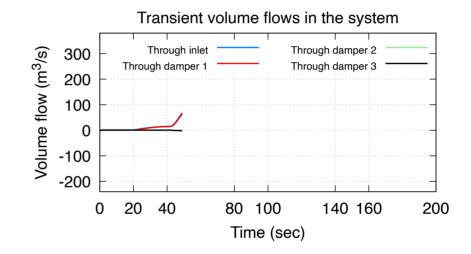
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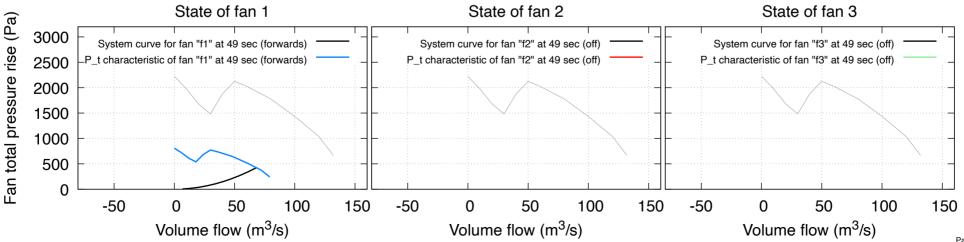
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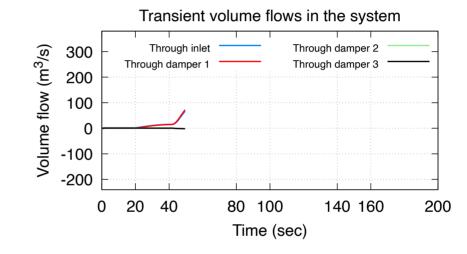
At 80 seconds, damper 2 opens

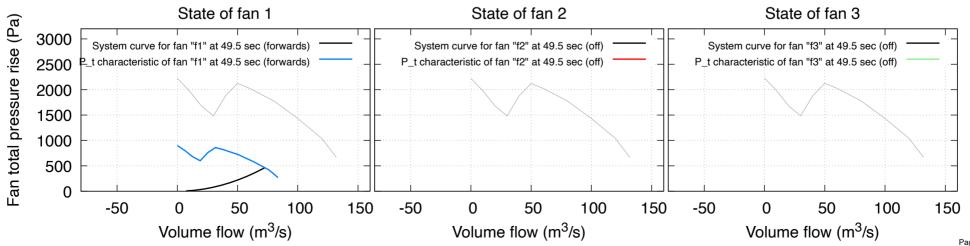
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Source file: ok-032-fans-in-parallel.txt.

Project no: 2 Project name: Software testing



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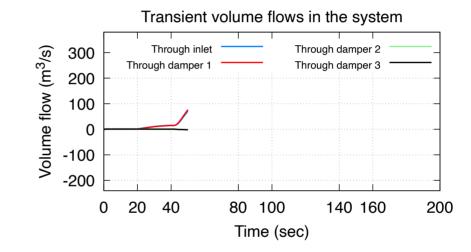
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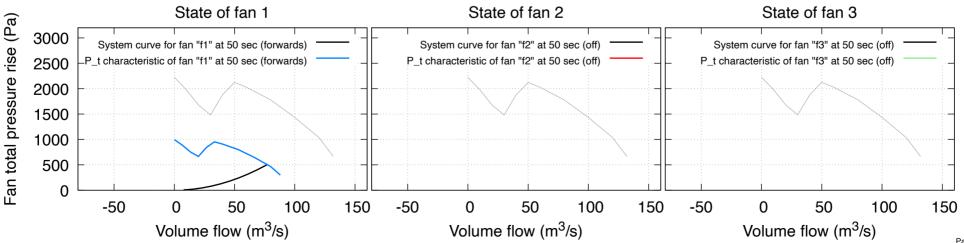
At 100 seconds, fan 2 starts

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Source file: ok-032-fans-in-parallel.txt.



raye 41

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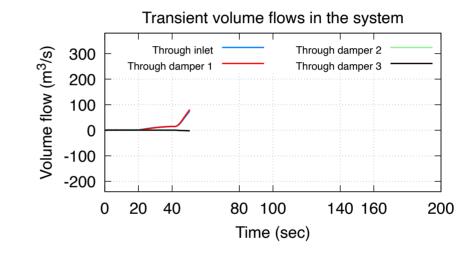
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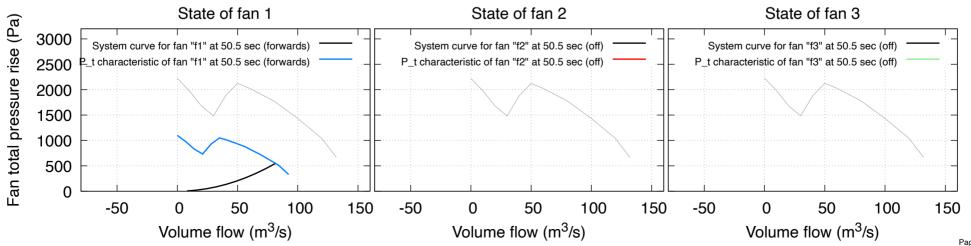
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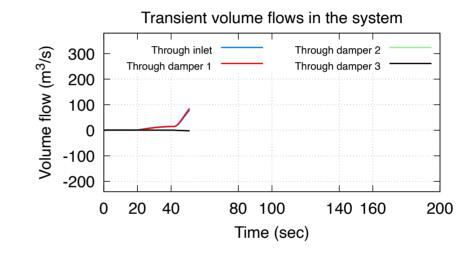
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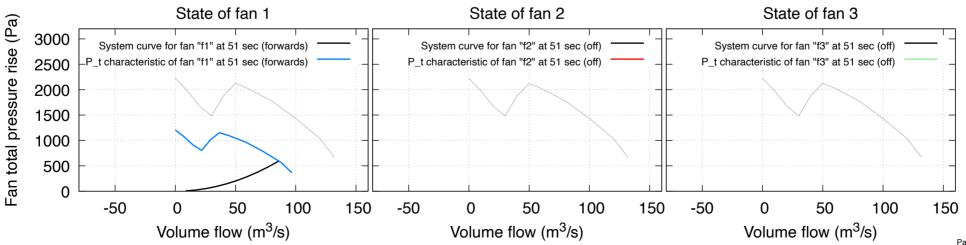
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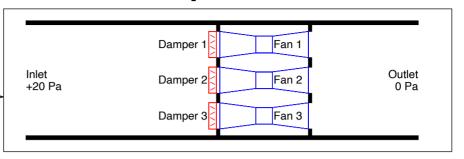
At 40 seconds, fan 1 starts

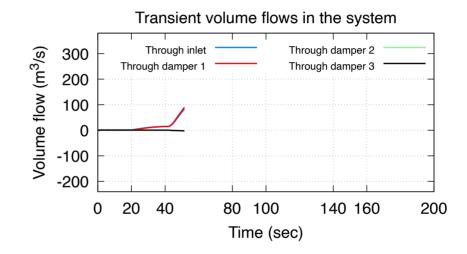
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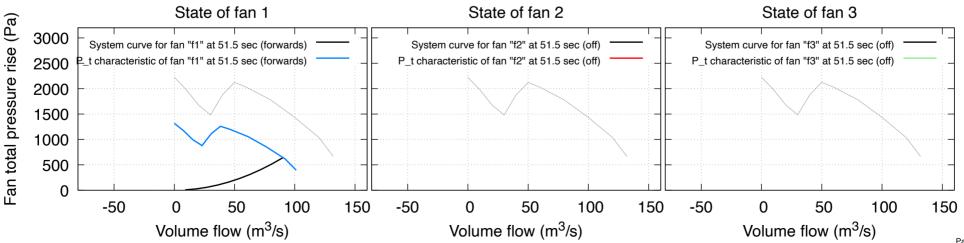
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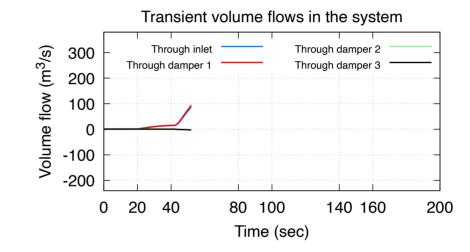
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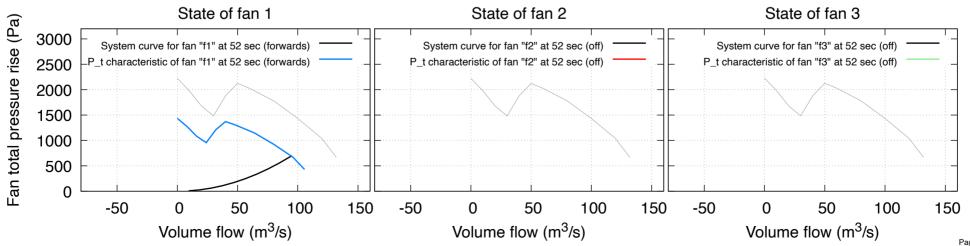
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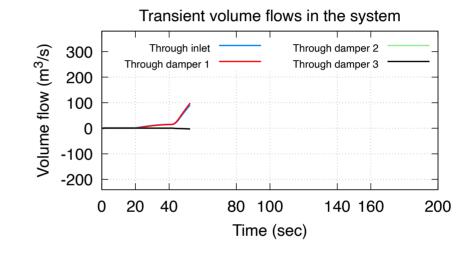
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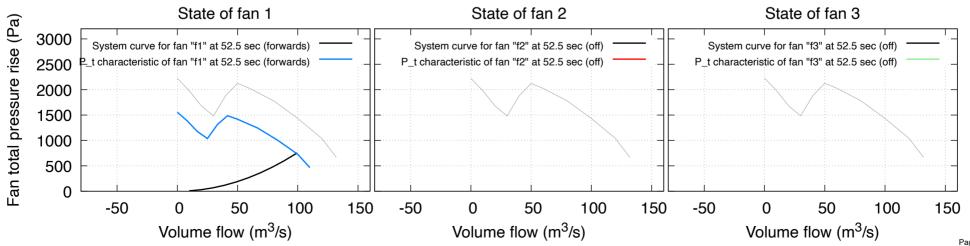
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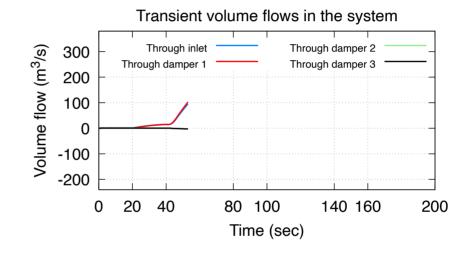
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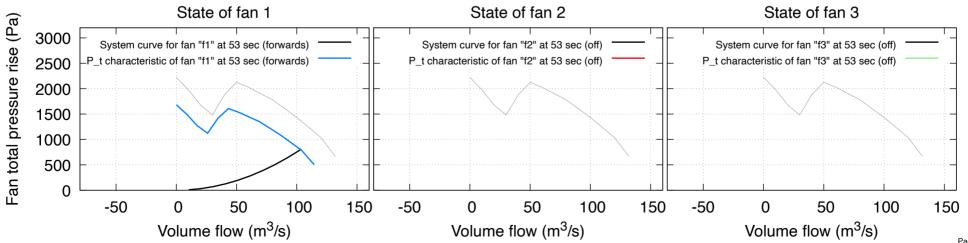
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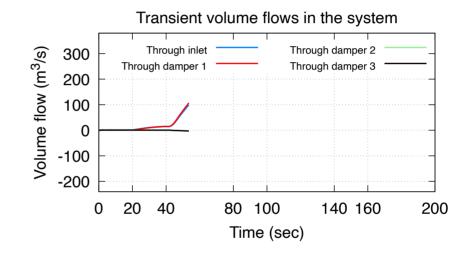
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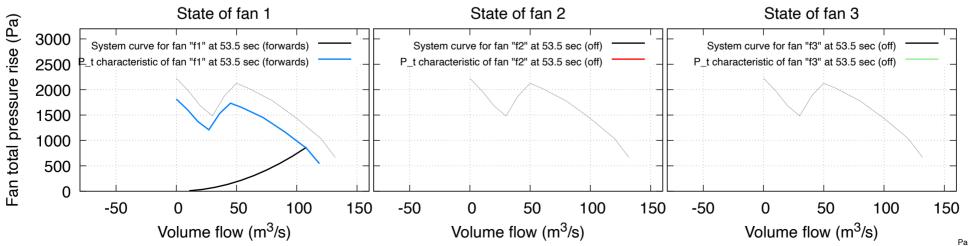
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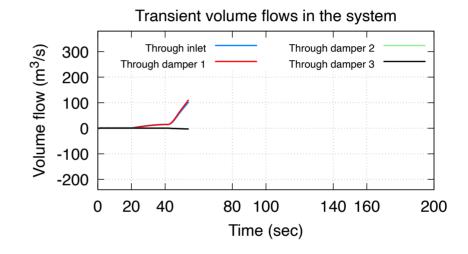
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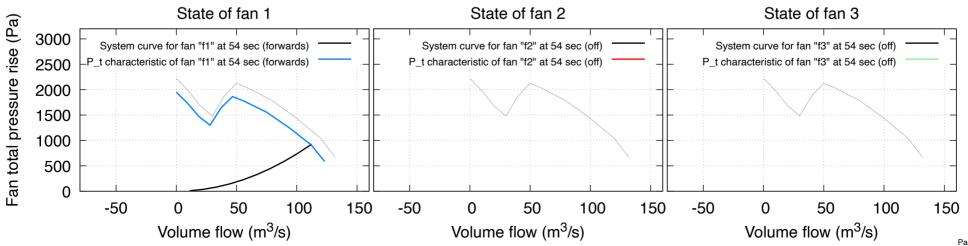
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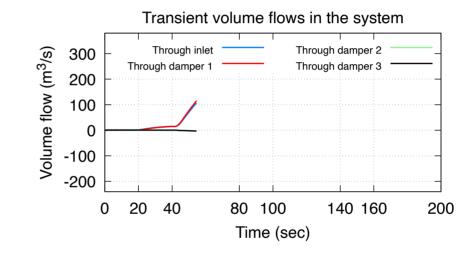
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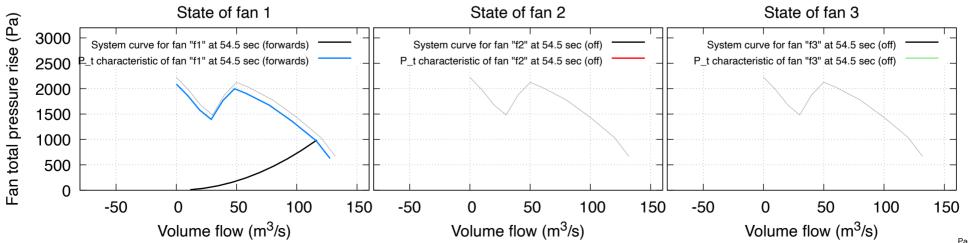
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Source file: ok-032-fans-in-parallel.txt.



Created by Hobyah.py from ok-032-fans-in-parallel.txt, 19:30 on 22 Jul 2024 by ecb

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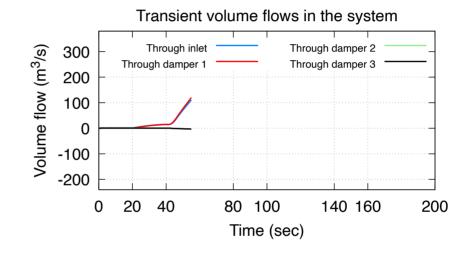
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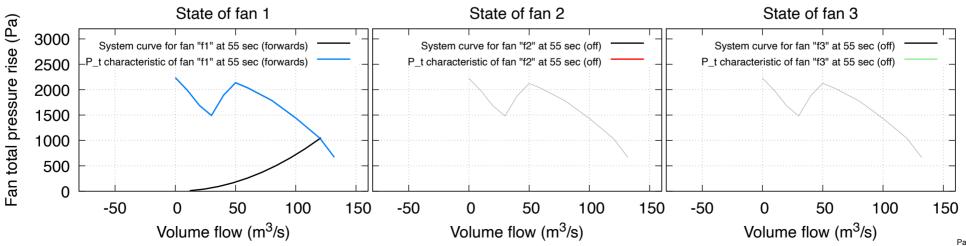
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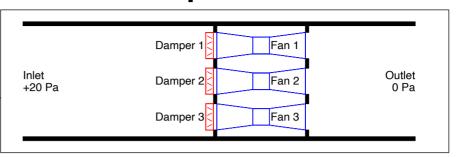
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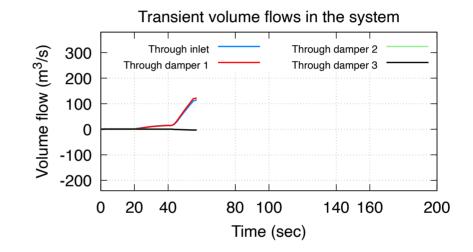
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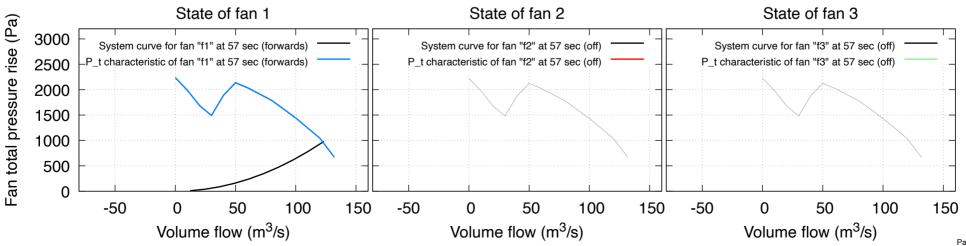
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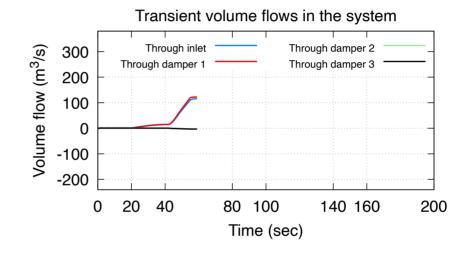
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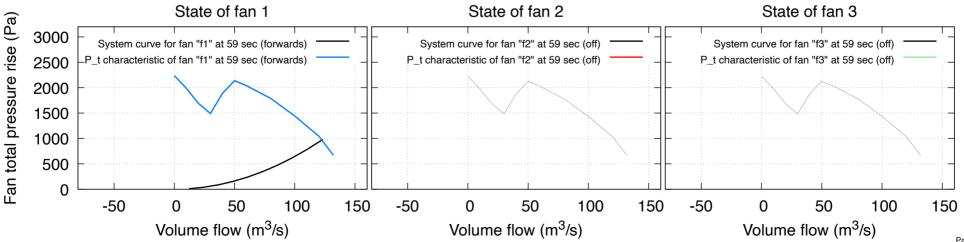
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Source file: ok-032-fans-in-parallel.txt.



Page 53

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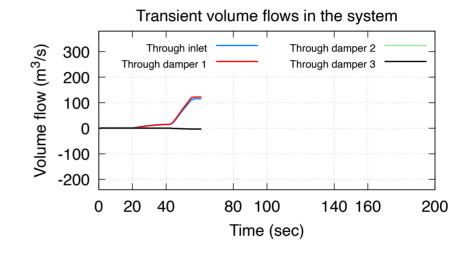
At 80 seconds, damper 2 opens

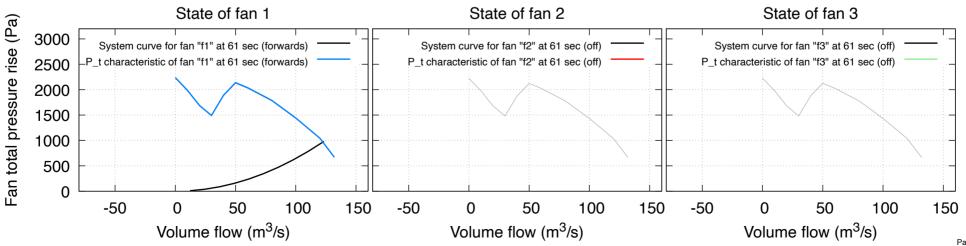
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

At 160 seconds, fan 3 starts









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At 20 seconds, damper 1 opens

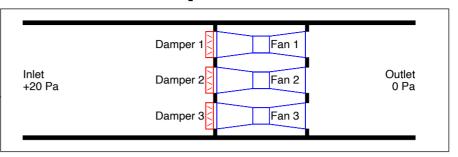
At 40 seconds, fan 1 starts

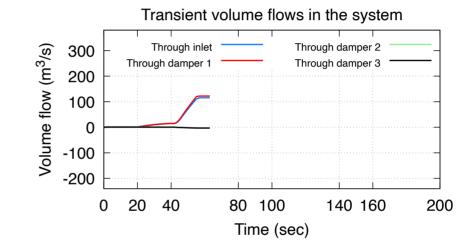
At 80 seconds, damper 2 opens

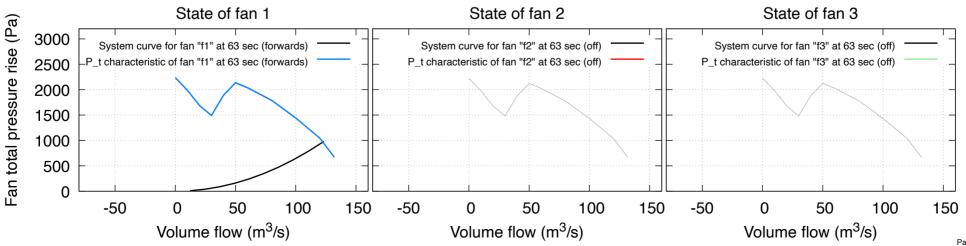
At 100 seconds, fan 2 starts

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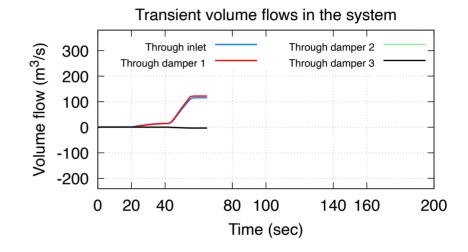
At 80 seconds, damper 2 opens

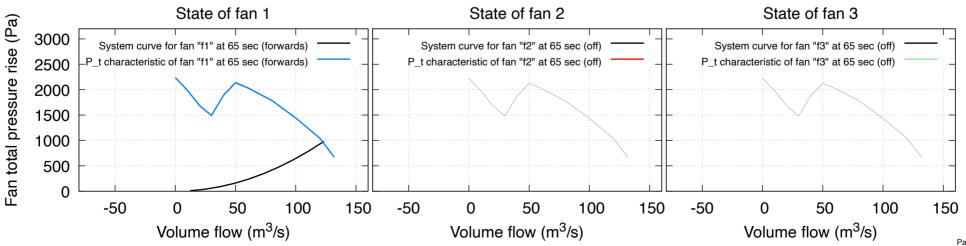
At 100 seconds, fan 2 starts

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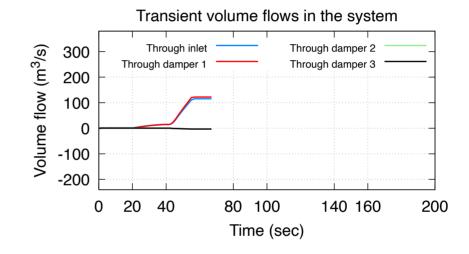
At 80 seconds, damper 2 opens

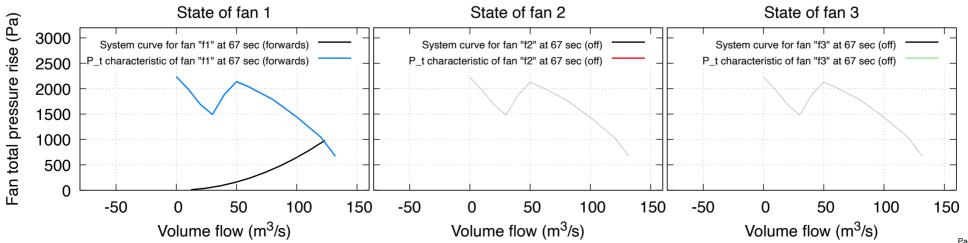
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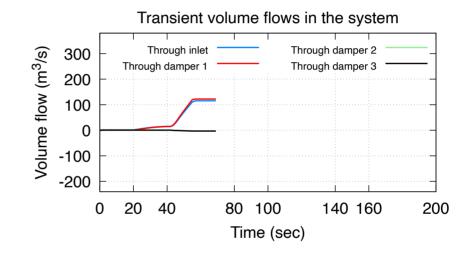
At 80 seconds, damper 2 opens

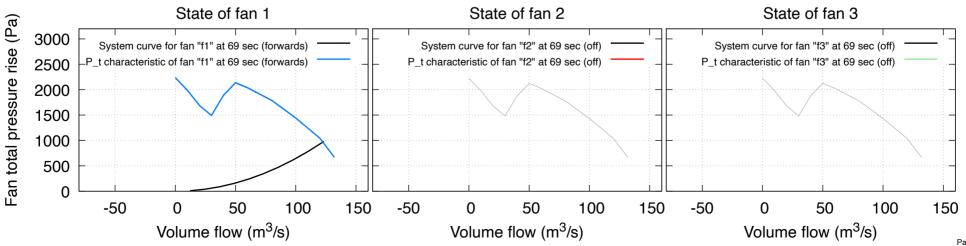
At 100 seconds, fan 2 starts

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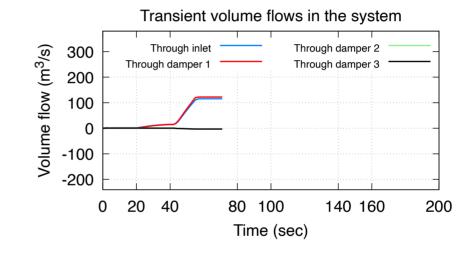
At 80 seconds, damper 2 opens

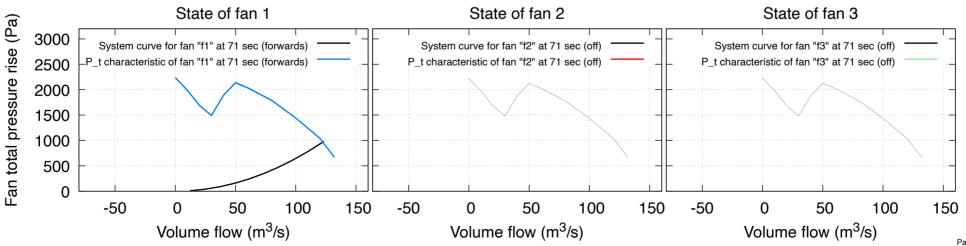
At 100 seconds, fan 2 starts

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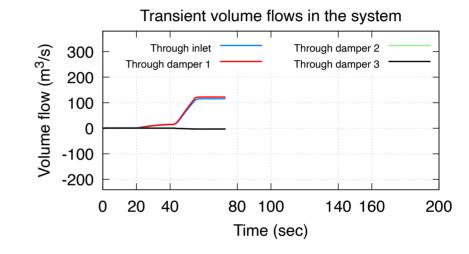
At 80 seconds, damper 2 opens

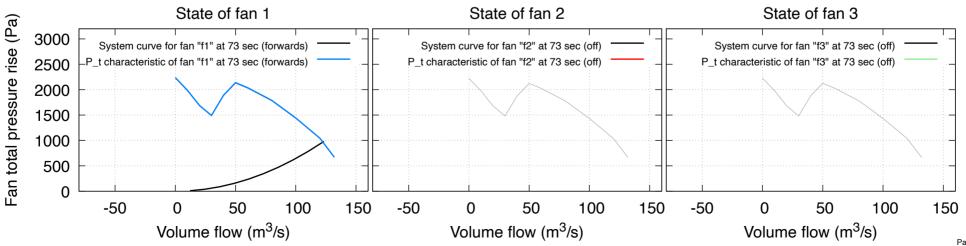
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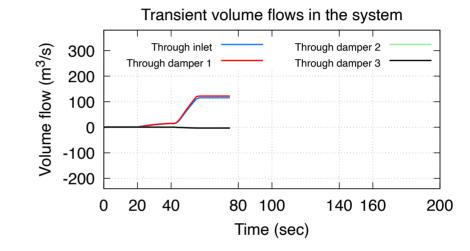
At 80 seconds, damper 2 opens

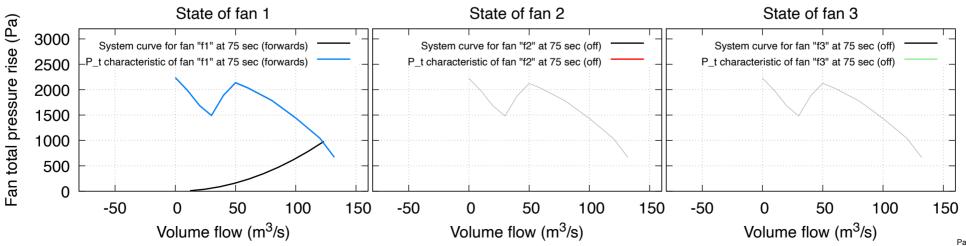
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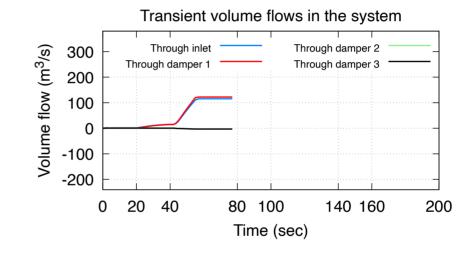
At 80 seconds, damper 2 opens

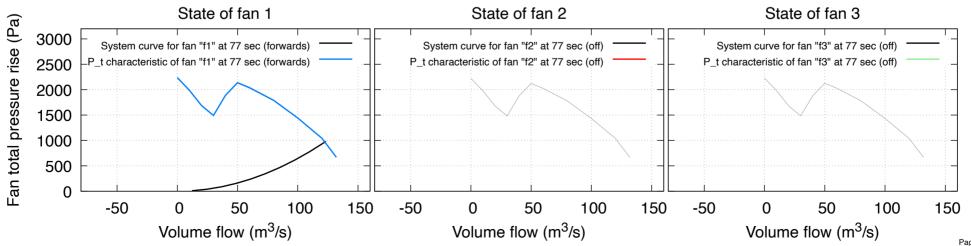
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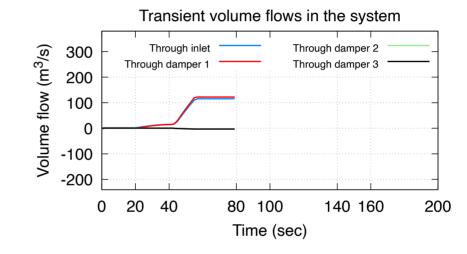
At 80 seconds, damper 2 opens

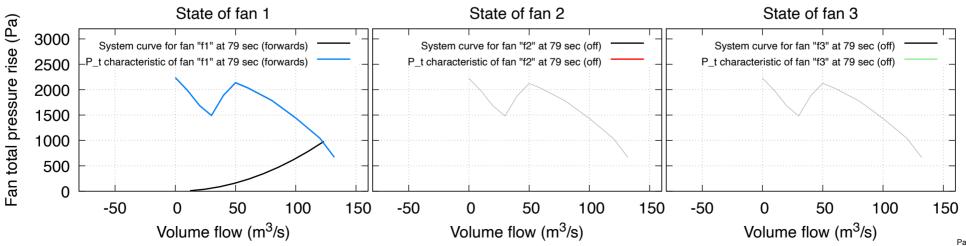
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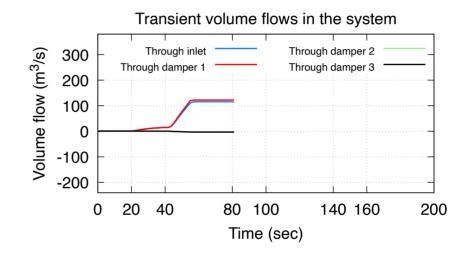
At 80 seconds, damper 2 opens

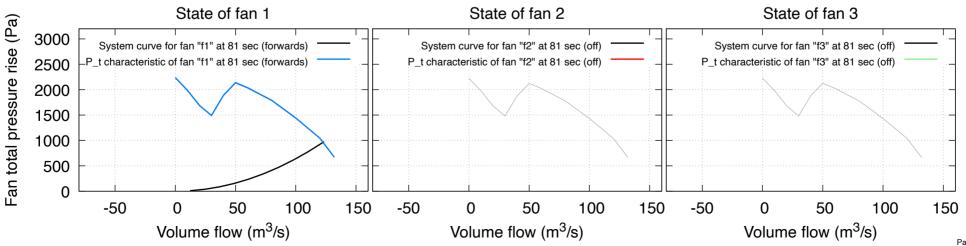
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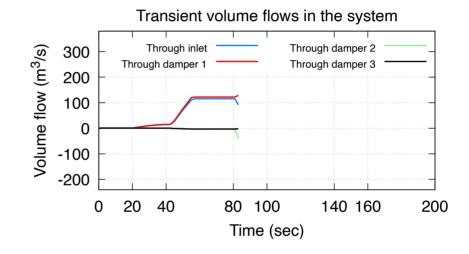
At 80 seconds, damper 2 opens

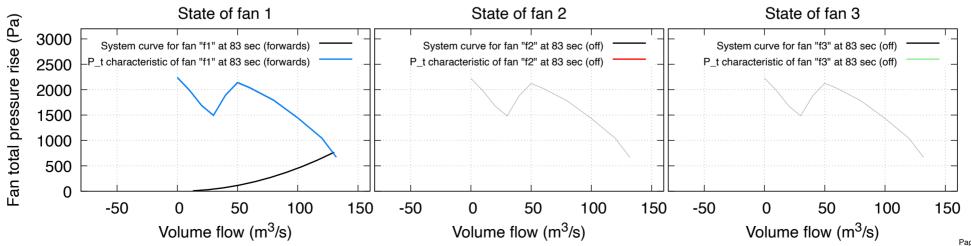
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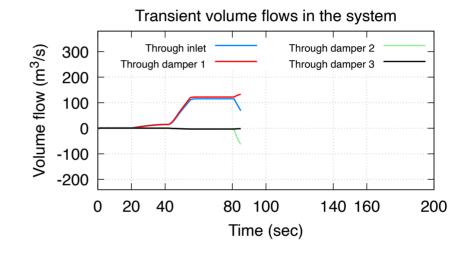
At 80 seconds, damper 2 opens

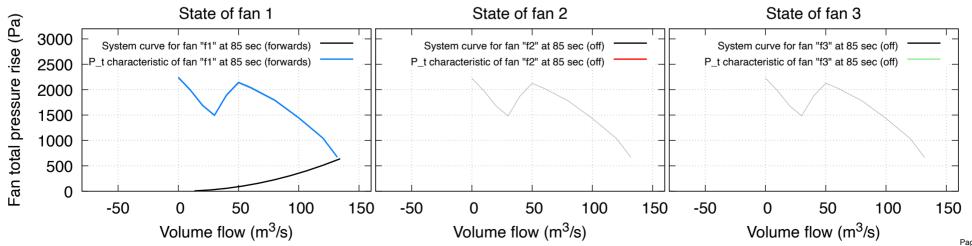
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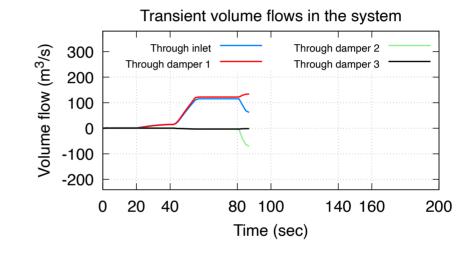
At 80 seconds, damper 2 opens

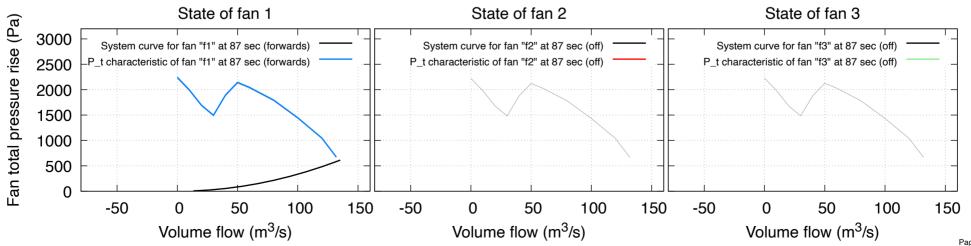
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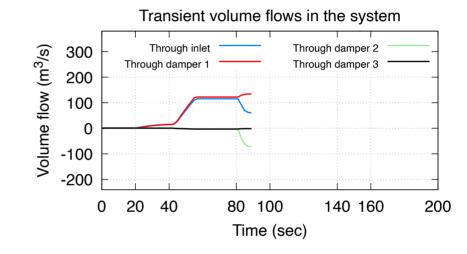
At 80 seconds, damper 2 opens

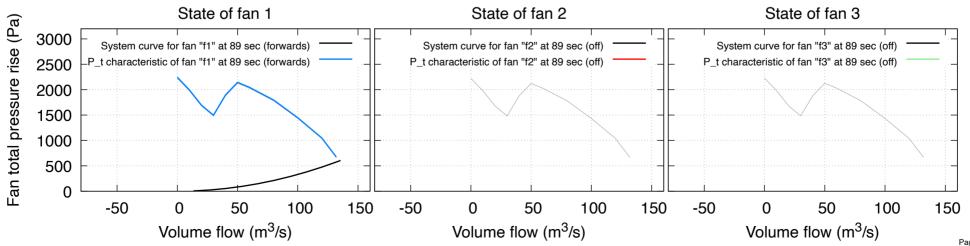
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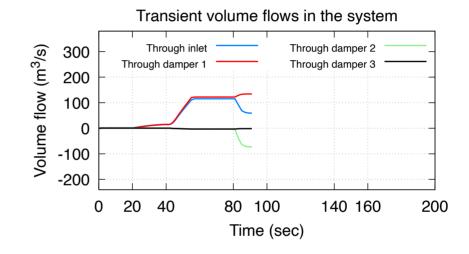
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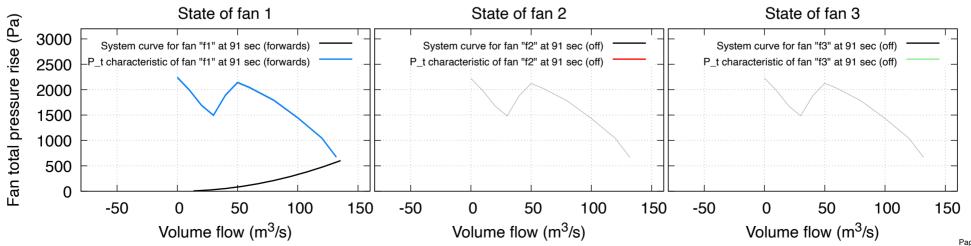
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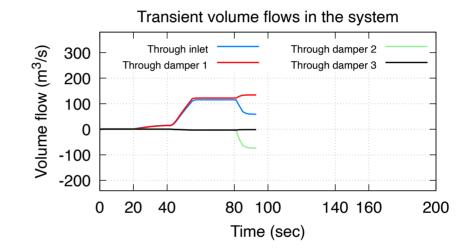
At 80 seconds, damper 2 opens

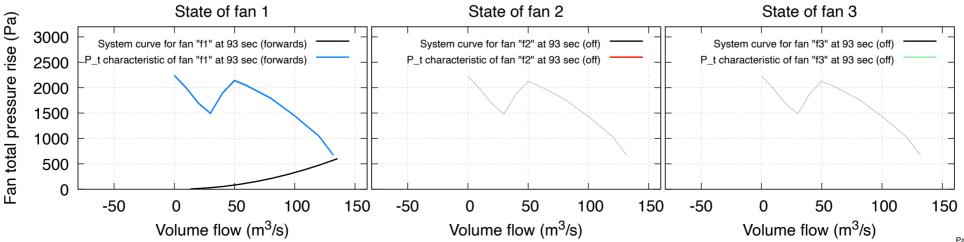
At 100 seconds, fan 2 starts

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Source file: ok-032-fans-in-parallel.txt.



Page 70

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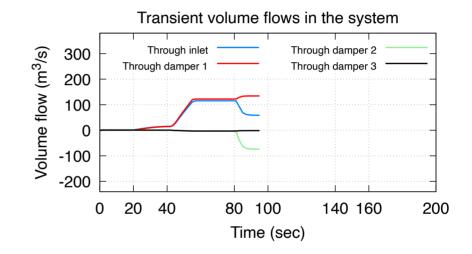
At 80 seconds, damper 2 opens

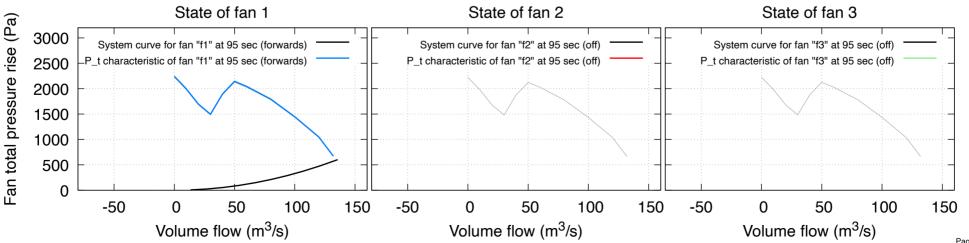
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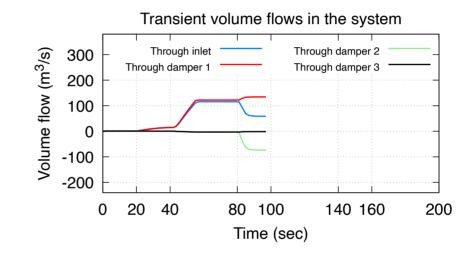
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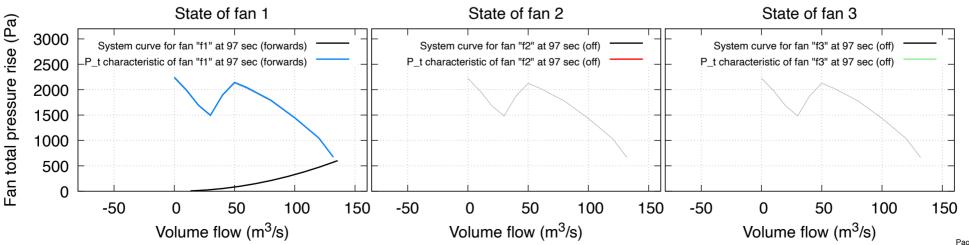
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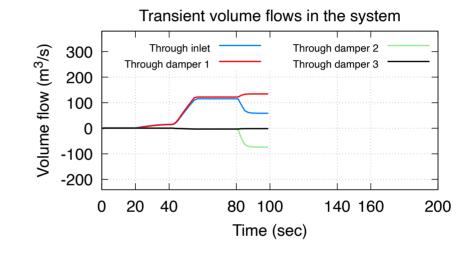
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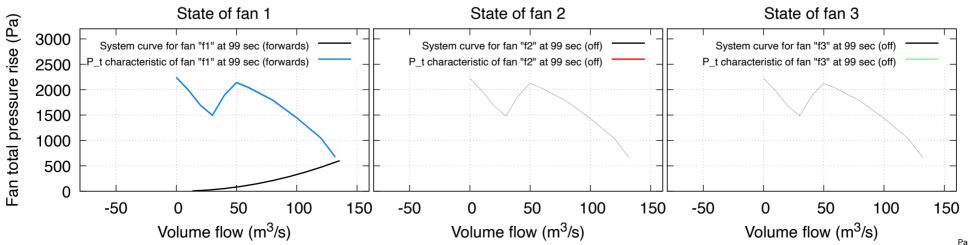
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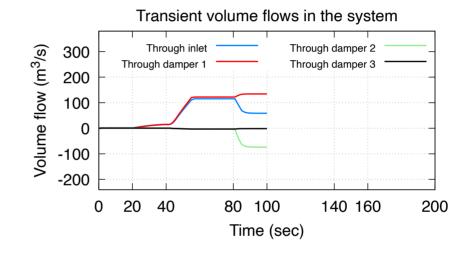
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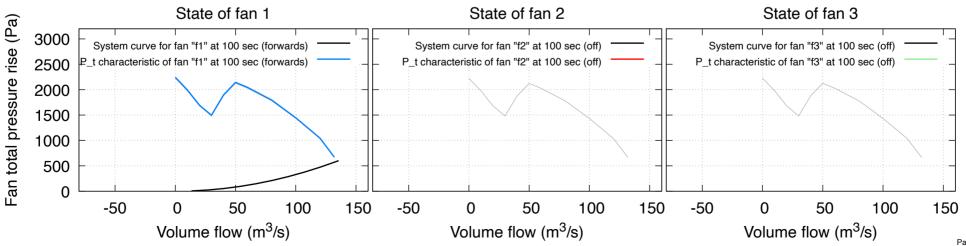
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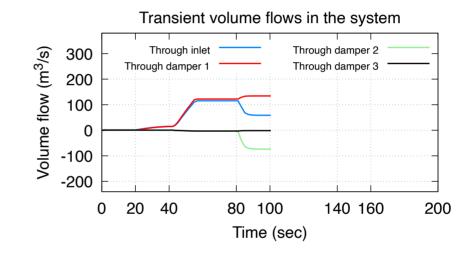
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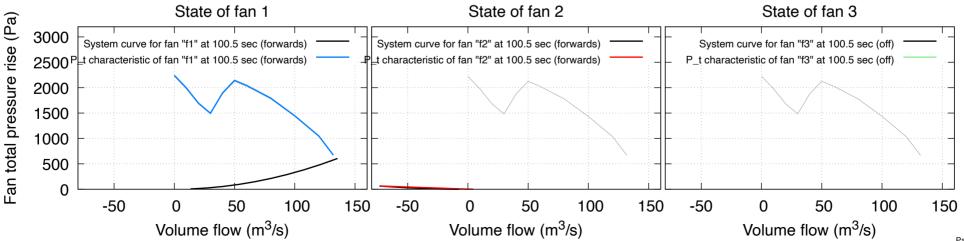
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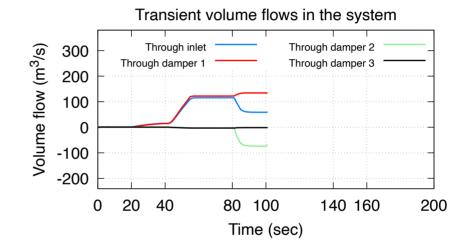
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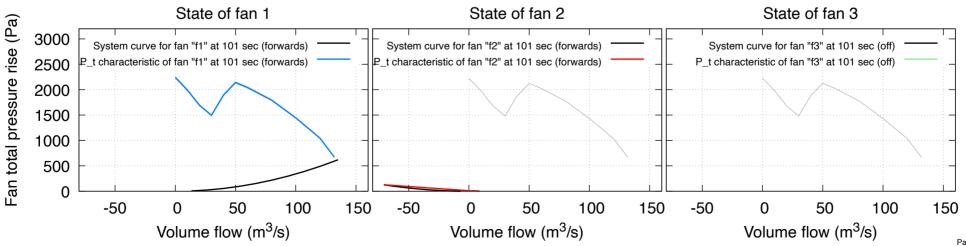
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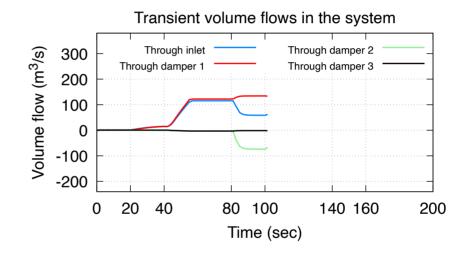
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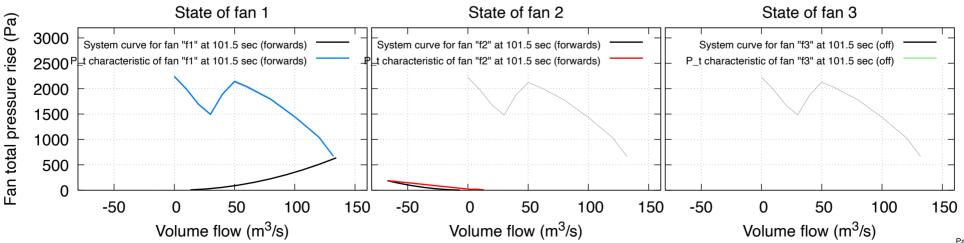
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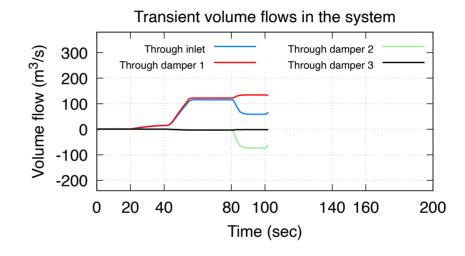
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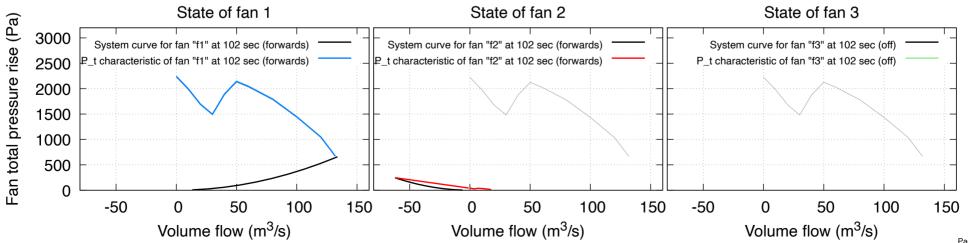
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Source file: ok-032-fans-in-parallel.txt.

Page 78

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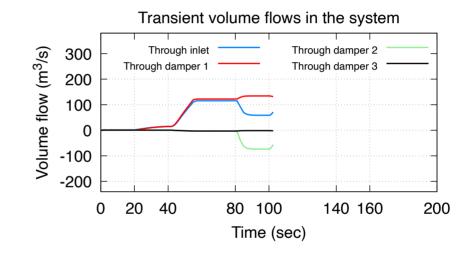
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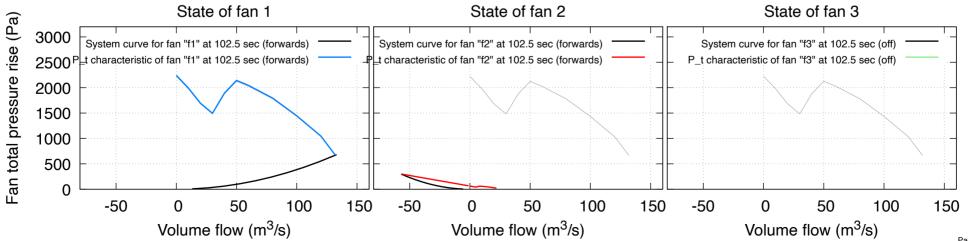
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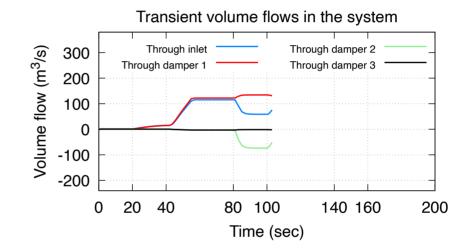
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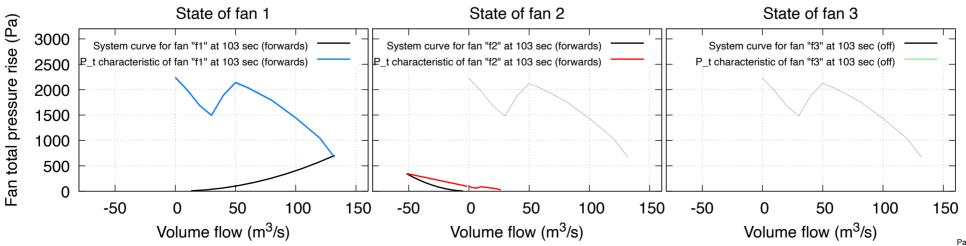
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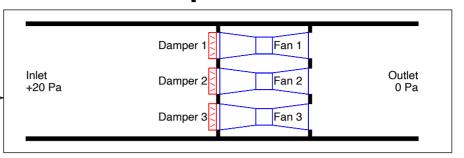
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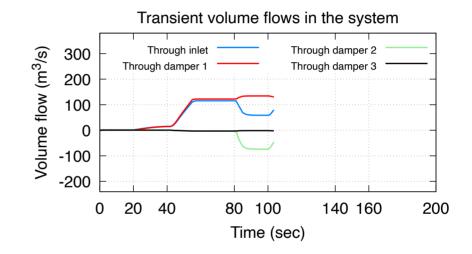
At 80 seconds, damper 2 opens

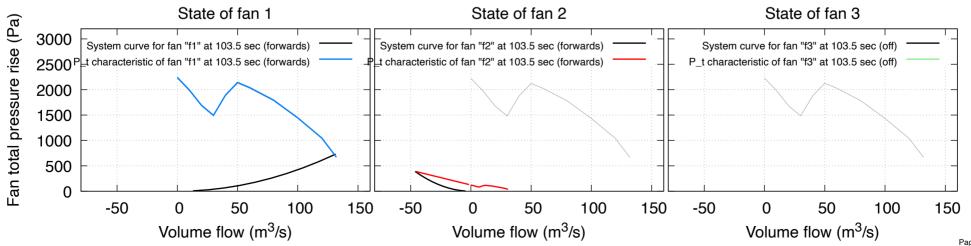
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

At 160 seconds, fan 3 starts









This flipbook illustrates a problem that can occur when you try to run fans in parallel that are unsuitable for running in parallel.

Consider three identical fans with isolation dampers, in parallel:— The fans have a Q-P_{tot} characteristic with a bad stall hump.

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At 20 seconds, damper 1 opens

At 40 seconds, fan 1 starts

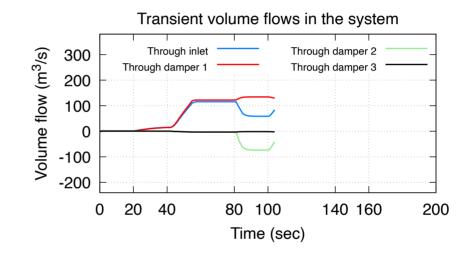
At 80 seconds, damper 2 opens

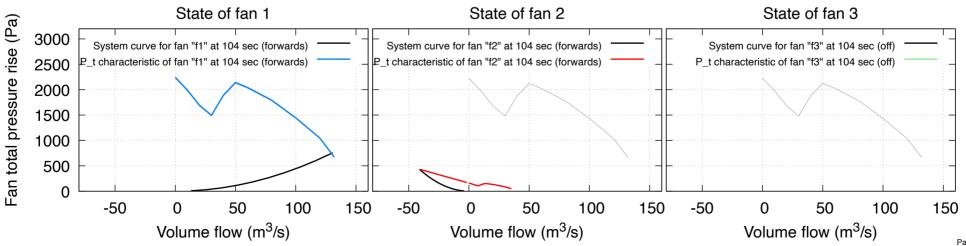
At 100 seconds, fan 2 starts

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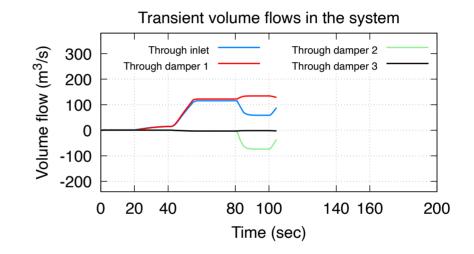
At 80 seconds, damper 2 opens

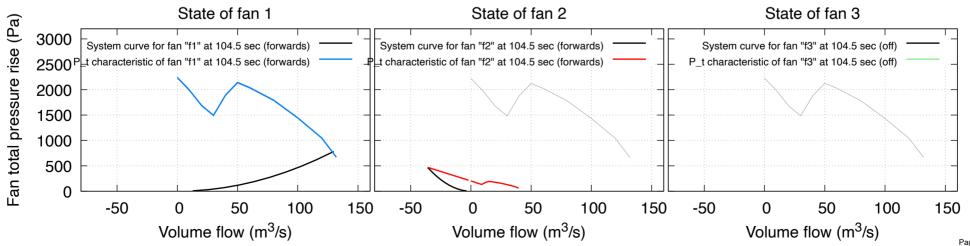
At 100 seconds, fan 2 starts

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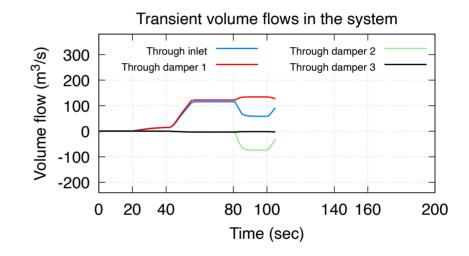
At 80 seconds, damper 2 opens

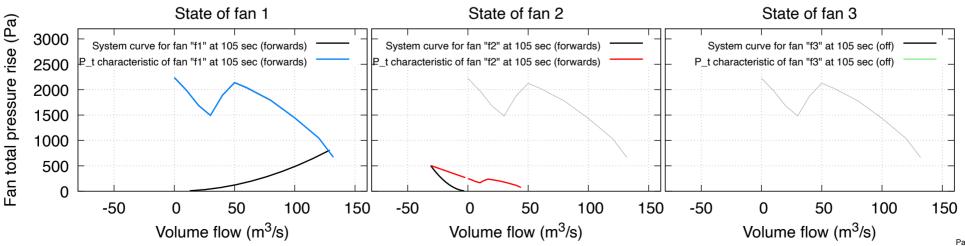
At 100 seconds, fan 2 starts

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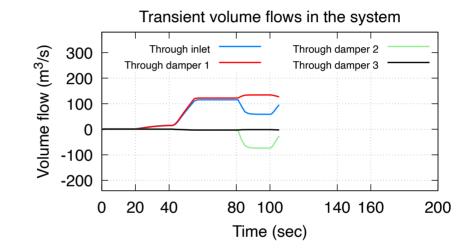
At 80 seconds, damper 2 opens

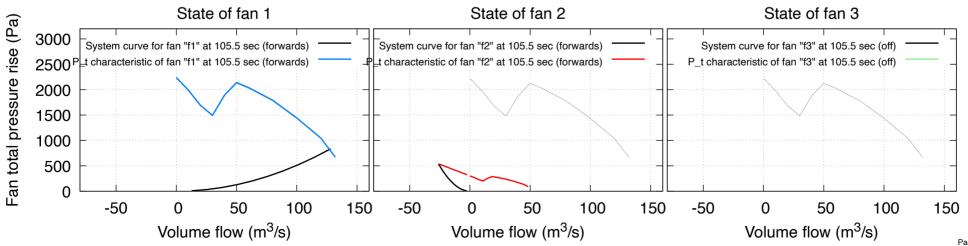
At 100 seconds, fan 2 starts

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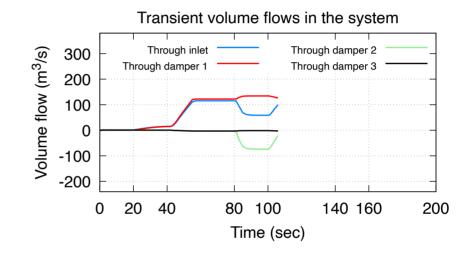
At 80 seconds, damper 2 opens

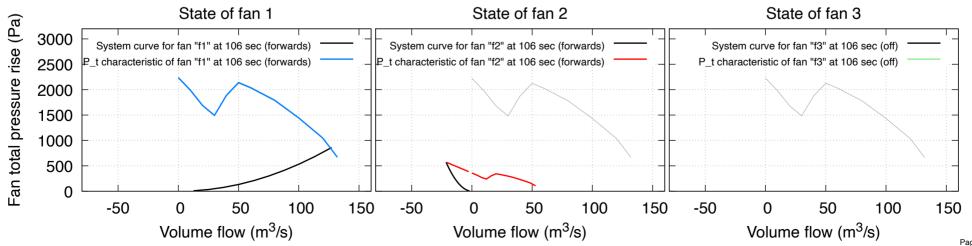
At 100 seconds, fan 2 starts

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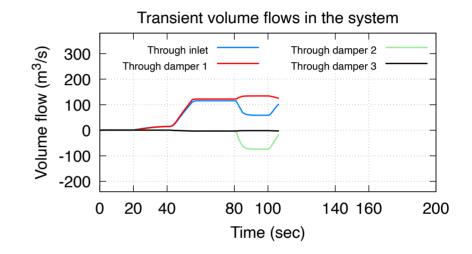
At 80 seconds, damper 2 opens

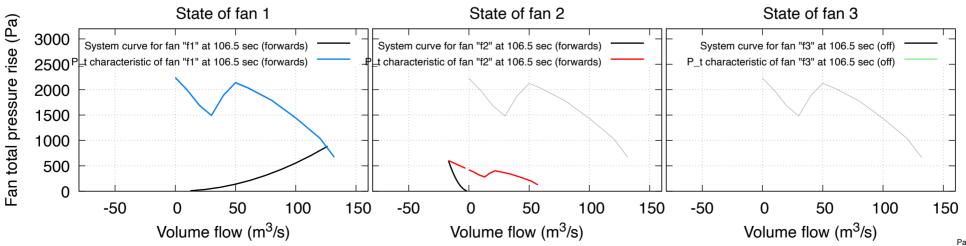
At 100 seconds, fan 2 starts

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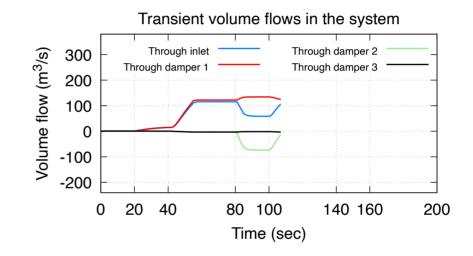
At 80 seconds, damper 2 opens

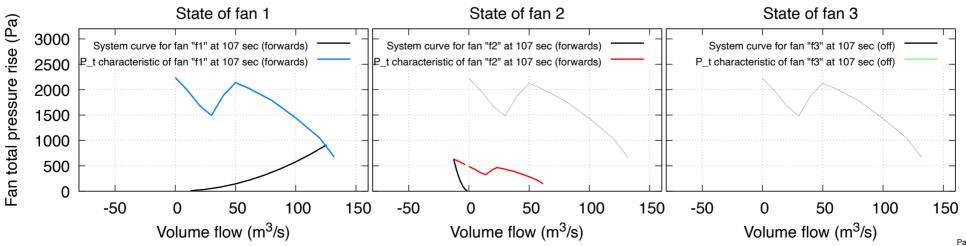
At 100 seconds, fan 2 starts

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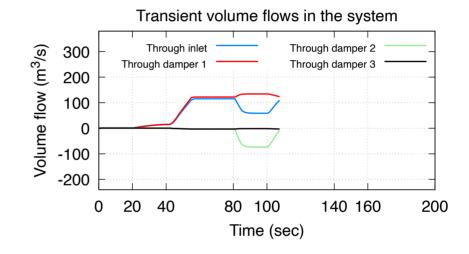
At 80 seconds, damper 2 opens

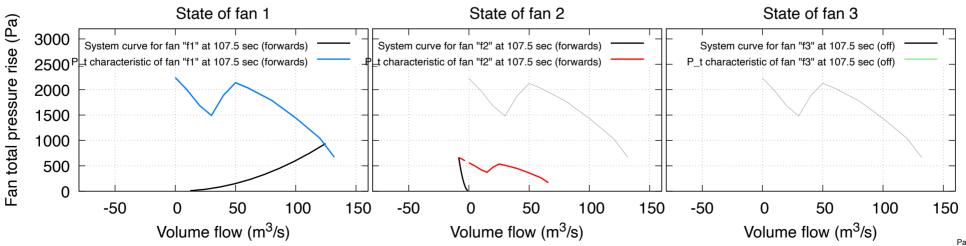
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

At 160 seconds, fan 3 starts









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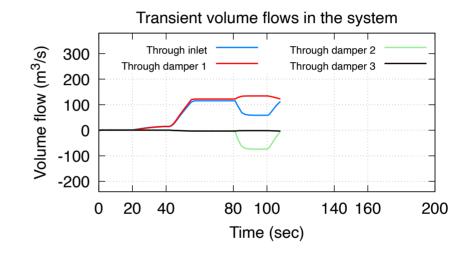
At 80 seconds, damper 2 opens

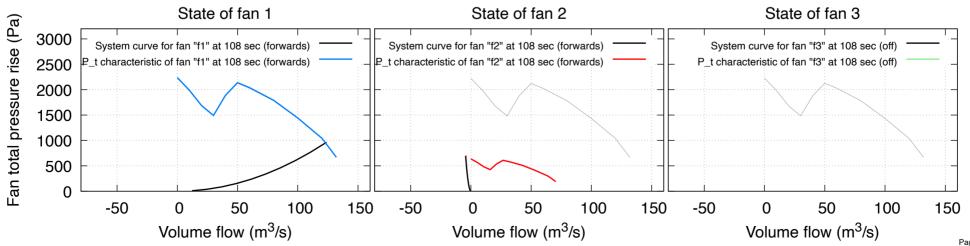
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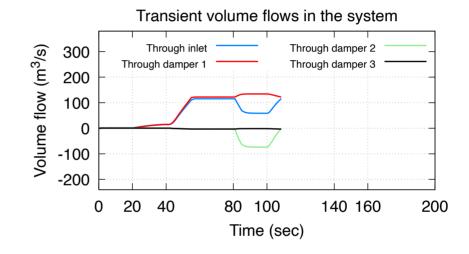
At 80 seconds, damper 2 opens

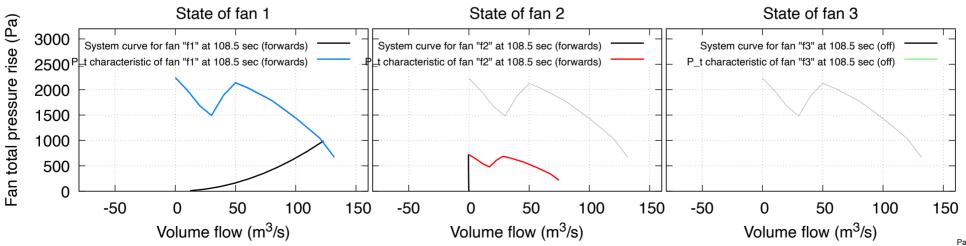
At 100 seconds, fan 2 starts

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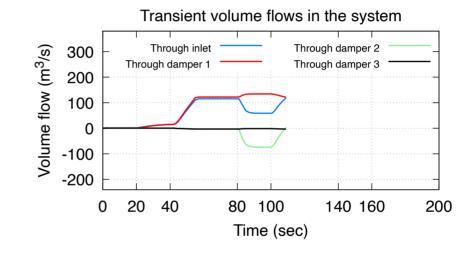
At 80 seconds, damper 2 opens

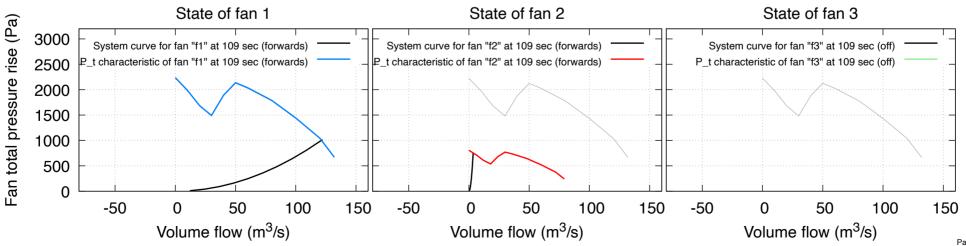
At 100 seconds, fan 2 starts

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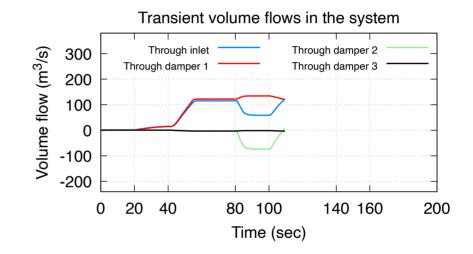
At 80 seconds, damper 2 opens

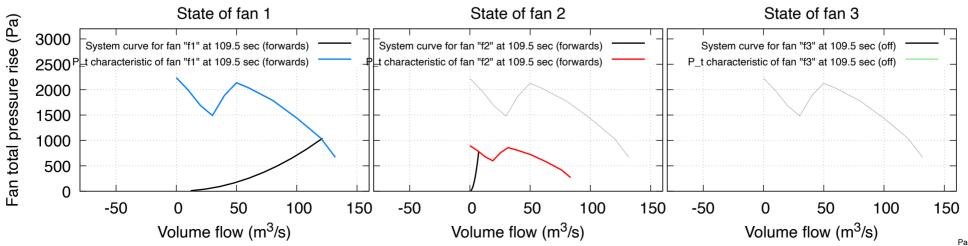
At 100 seconds, fan 2 starts

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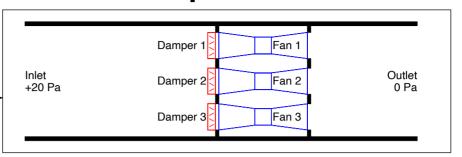
At 40 seconds, fan 1 starts

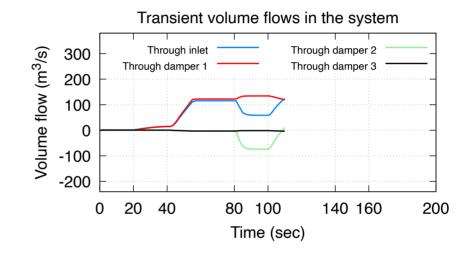
At 80 seconds, damper 2 opens

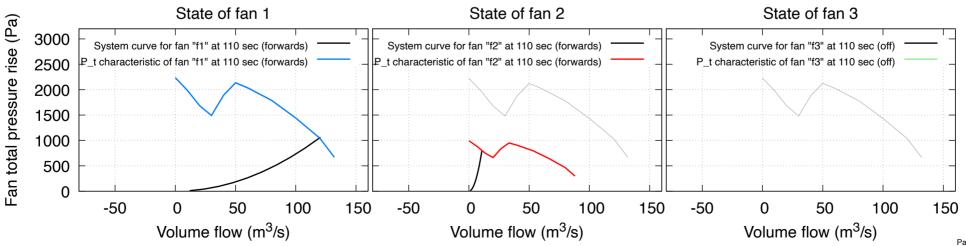
At 100 seconds, fan 2 starts

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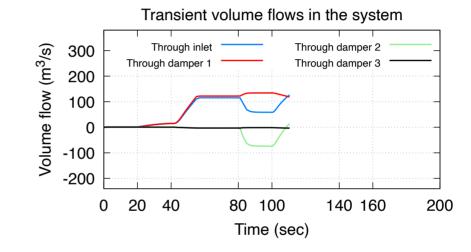
At 80 seconds, damper 2 opens

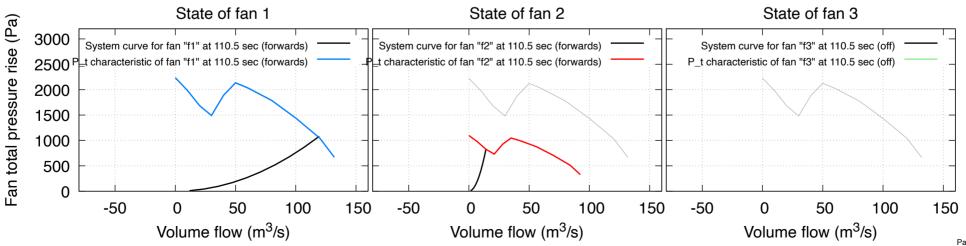
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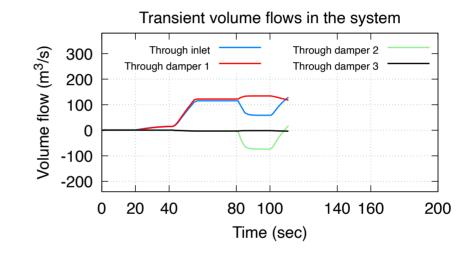
At 80 seconds, damper 2 opens

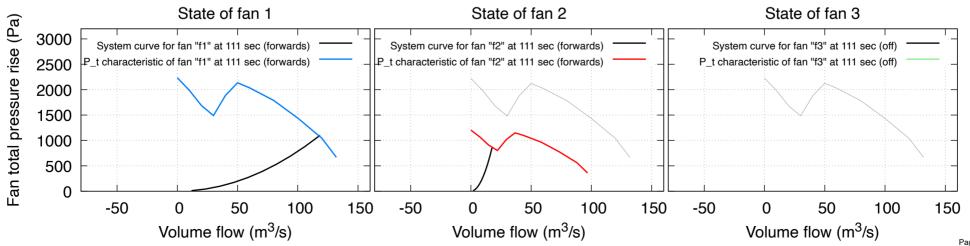
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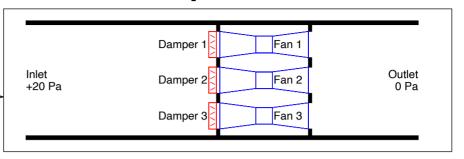
At 40 seconds, fan 1 starts

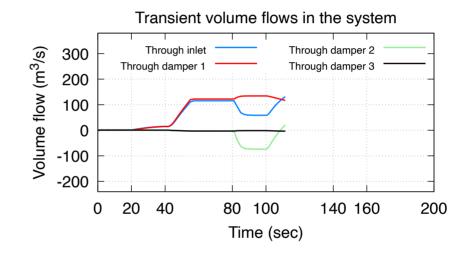
At 80 seconds, damper 2 opens

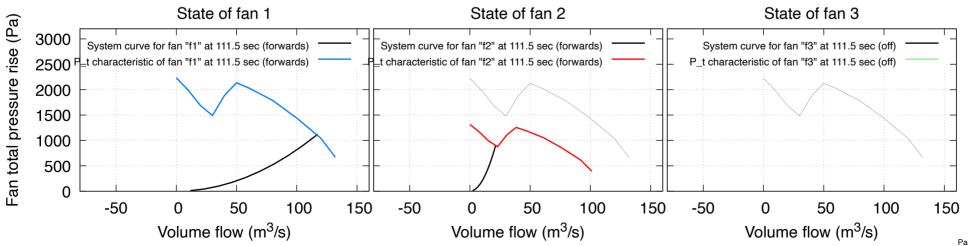
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Source file: ok-032-fans-in-parallel.txt.

Project no: 2 Project name: Software testing



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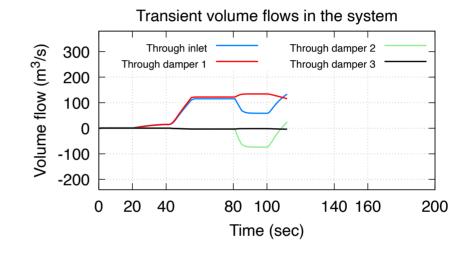
At 80 seconds, damper 2 opens

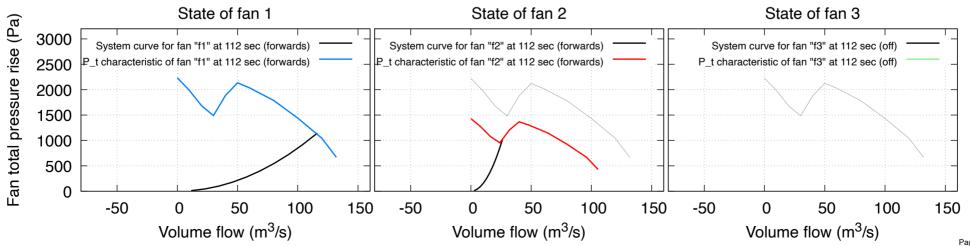
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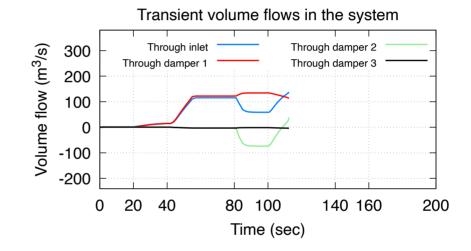
At 80 seconds, damper 2 opens

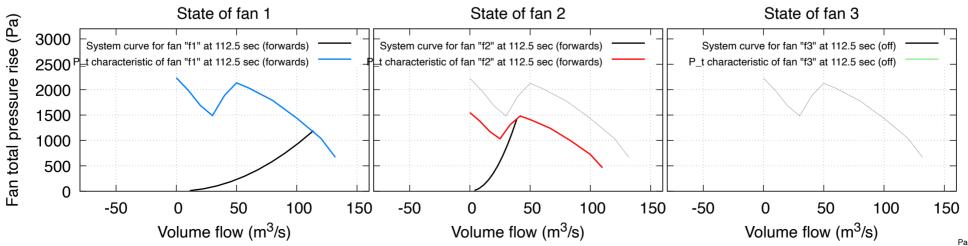
At 100 seconds, fan 2 starts

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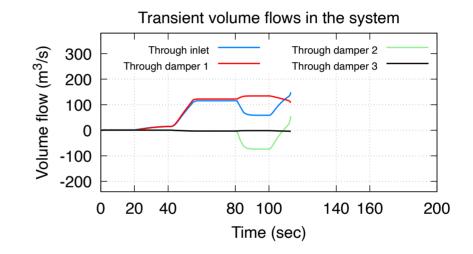
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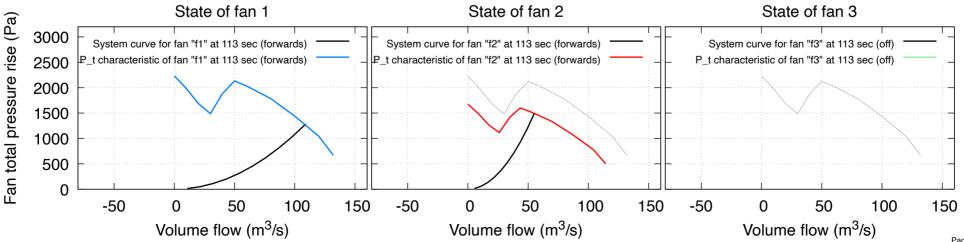
At 100 seconds, fan 2 starts

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Source file: ok-032-fans-in-parallel.txt.



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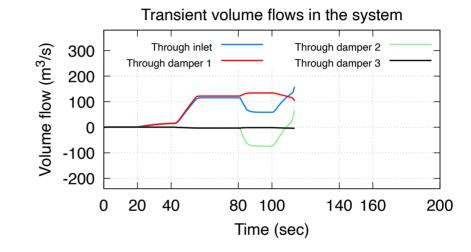
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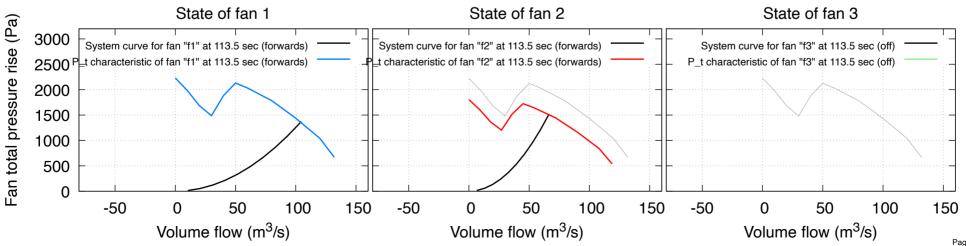
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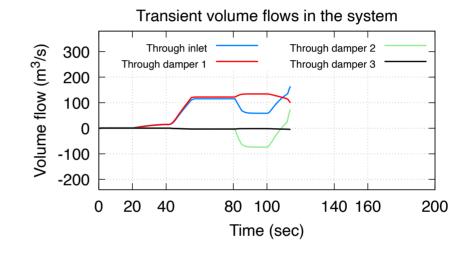
At 80 seconds, damper 2 opens

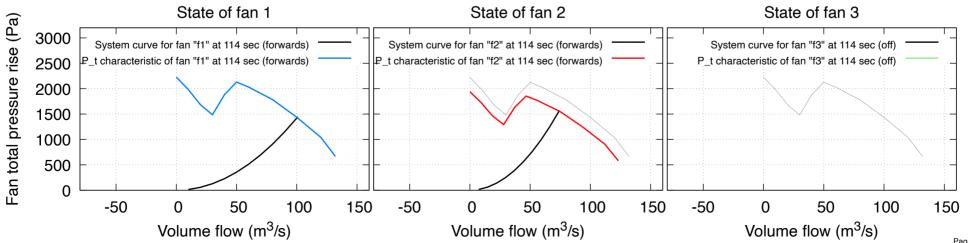
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Source file: ok-032-fans-in-parallel.txt.

J

Page 102

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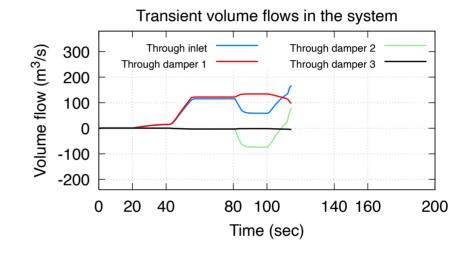
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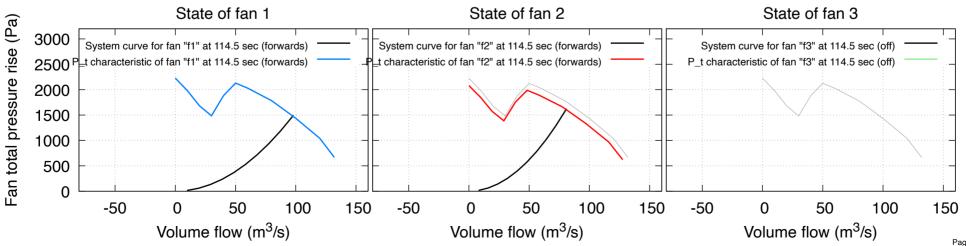
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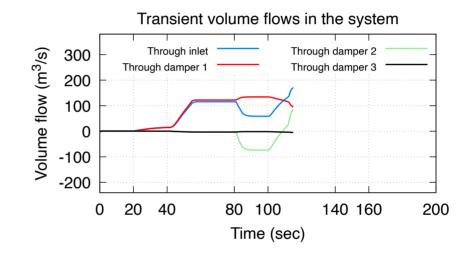
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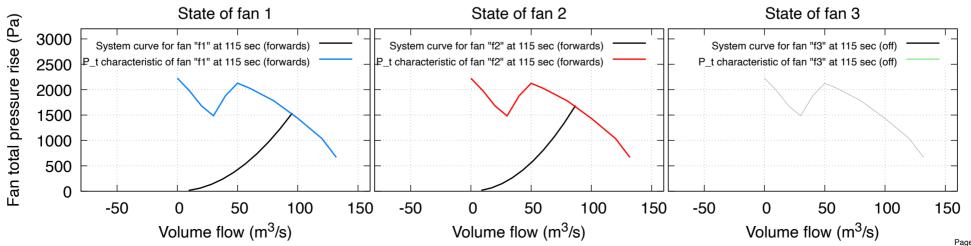
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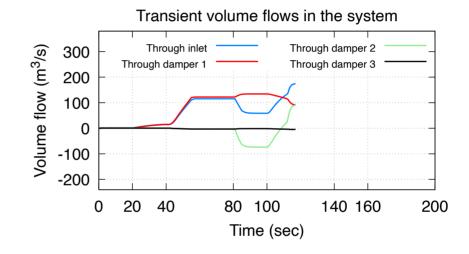
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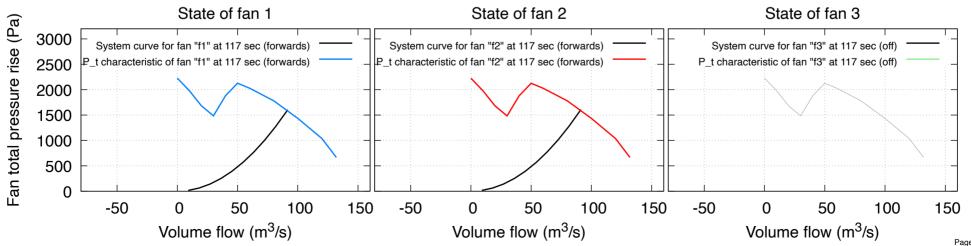
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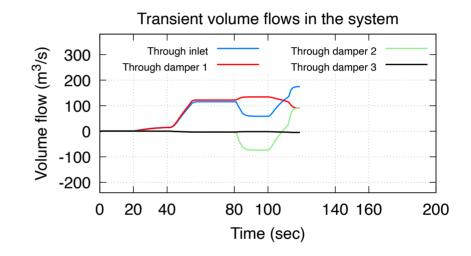
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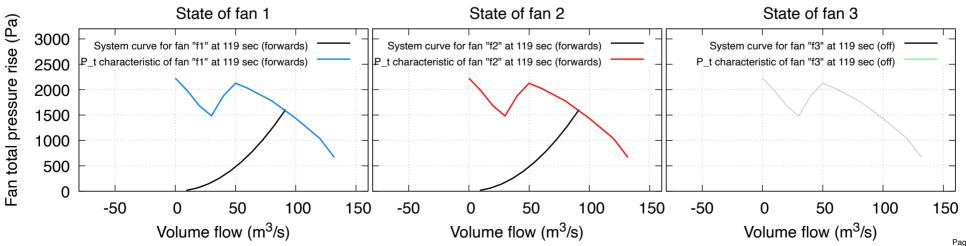
At 100 seconds, fan 2 starts

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Source file: ok-032-fans-in-parallel.txt.



Created by Hobyah.py from ok-032-fans-in-parallel.txt, 19:30 on 22 Jul 2024 by ecb

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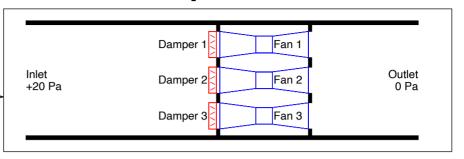
At 40 seconds, fan 1 starts

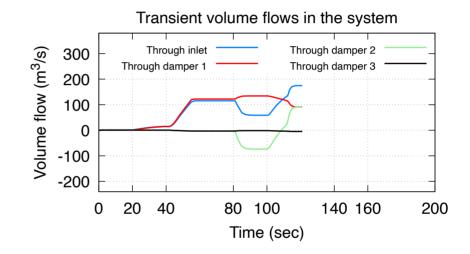
At 80 seconds, damper 2 opens

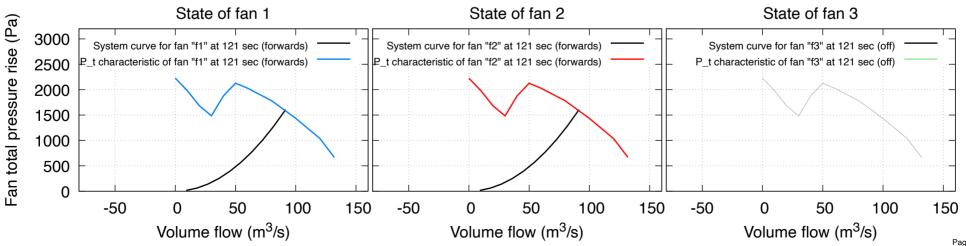
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At 160 seconds, fan 3 starts









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Consider three identical fans with isolation dampers, in parallel:— The fans have a Q-P_{tot} characteristic with a bad stall hump.

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At 20 seconds, damper 1 opens

At 40 seconds, fan 1 starts

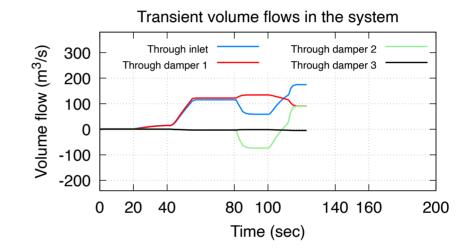
At 80 seconds, damper 2 opens

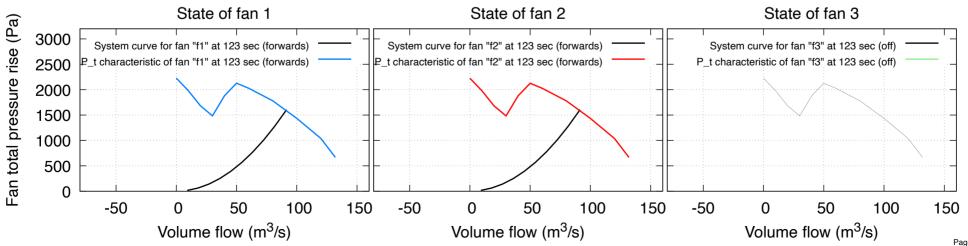
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

At 160 seconds, fan 3 starts







Source file: ok-032-fans-in-parallel.txt.



Created by Hobyah.py from ok-032-fans-in-parallel.txt, 19:30 on 22 Jul 2024 by ecb

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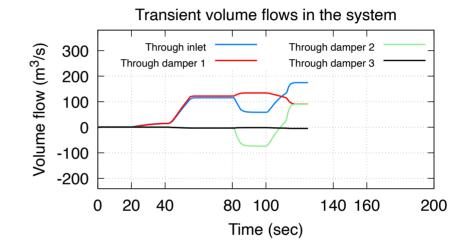
At 80 seconds, damper 2 opens

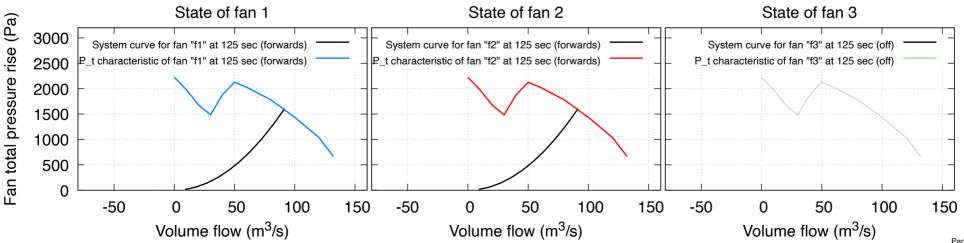
At 100 seconds, fan 2 starts

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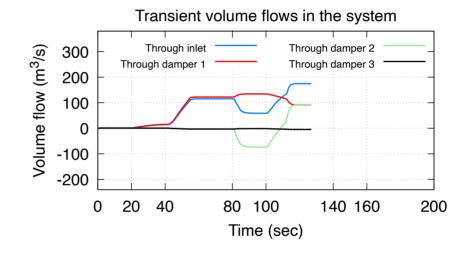
At 80 seconds, damper 2 opens

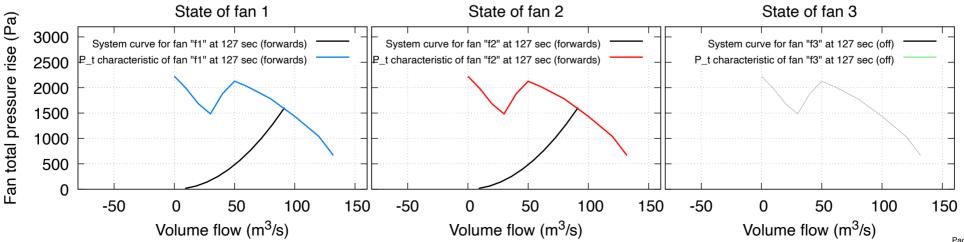
At 100 seconds, fan 2 starts

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At 40 seconds, fan 1 starts

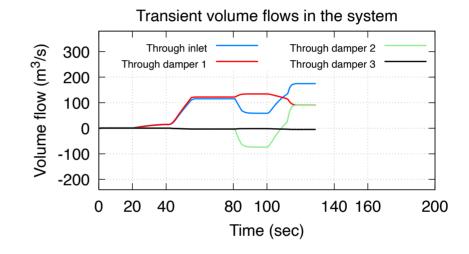
At 80 seconds, damper 2 opens

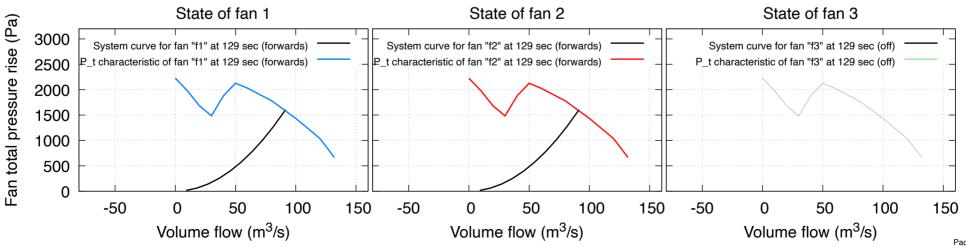
At 100 seconds, fan 2 starts

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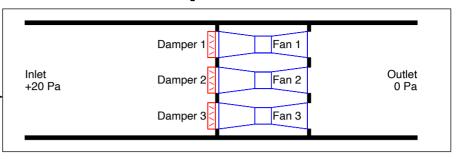
At 40 seconds, fan 1 starts

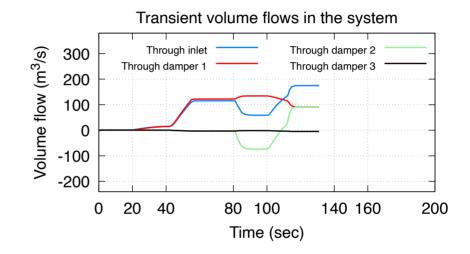
At 80 seconds, damper 2 opens

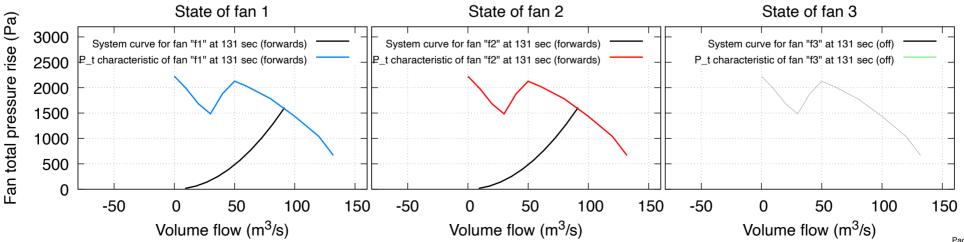
At 100 seconds, fan 2 starts

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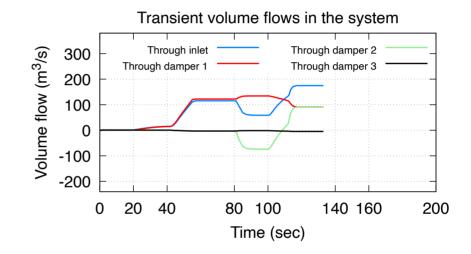
At 80 seconds, damper 2 opens

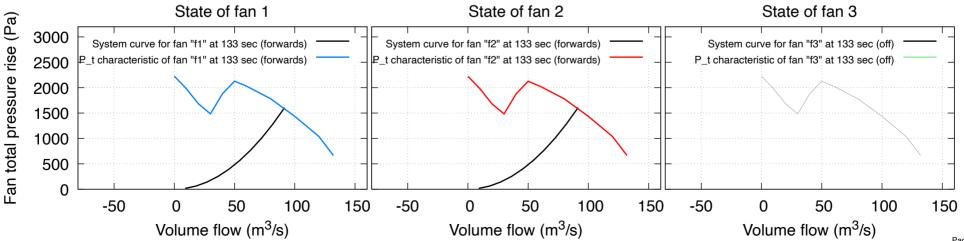
At 100 seconds, fan 2 starts

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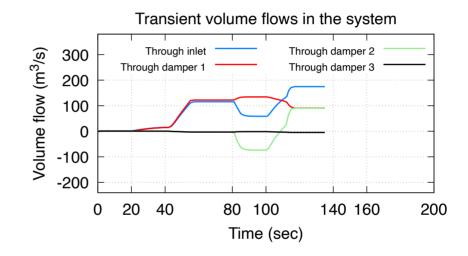
At 80 seconds, damper 2 opens

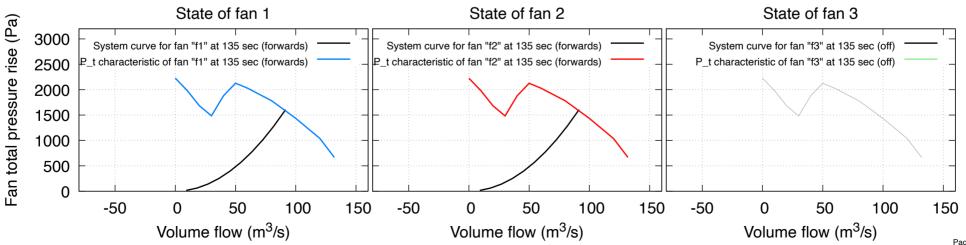
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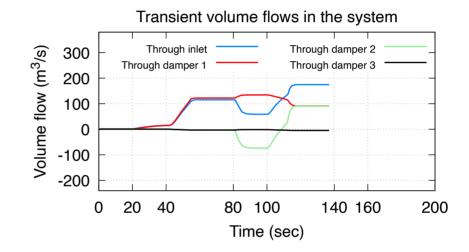
At 80 seconds, damper 2 opens

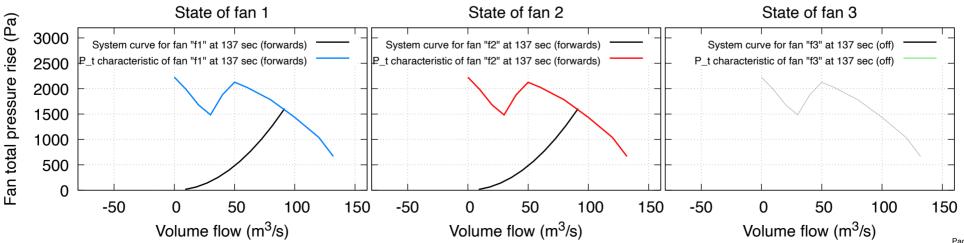
At 100 seconds, fan 2 starts

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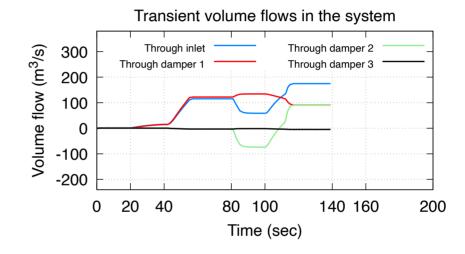
At 80 seconds, damper 2 opens

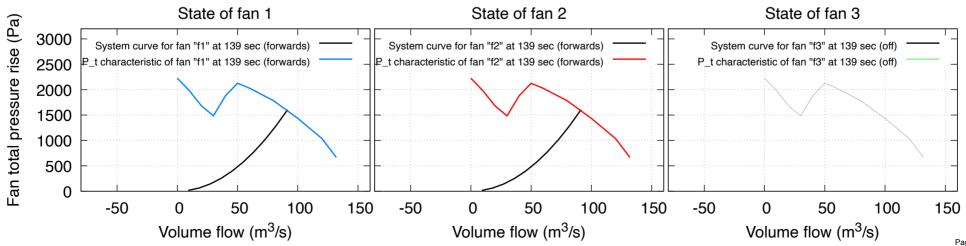
At 100 seconds, fan 2 starts

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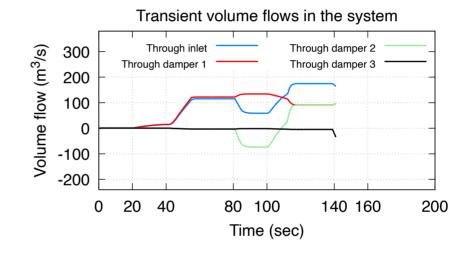
At 80 seconds, damper 2 opens

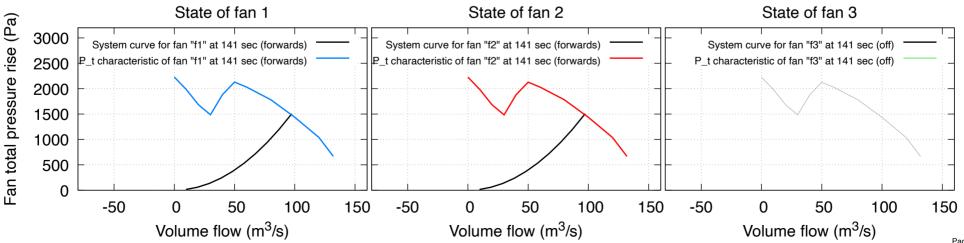
At 100 seconds, fan 2 starts

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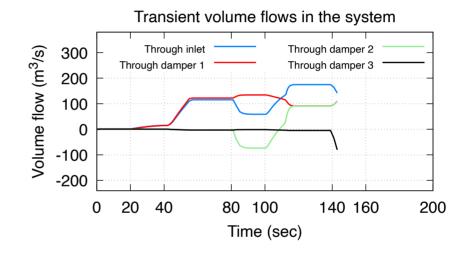
At 80 seconds, damper 2 opens

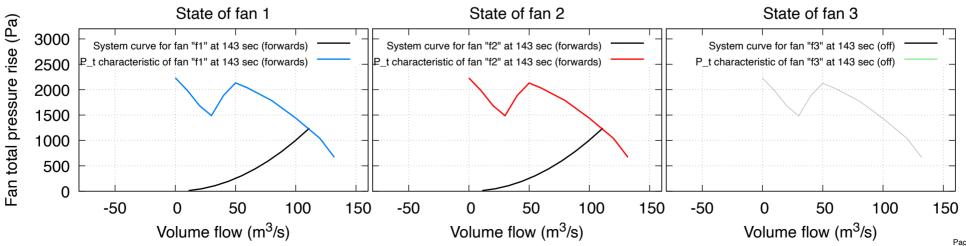
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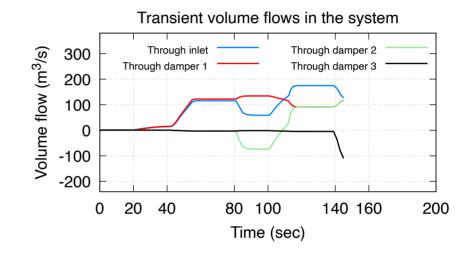
At 80 seconds, damper 2 opens

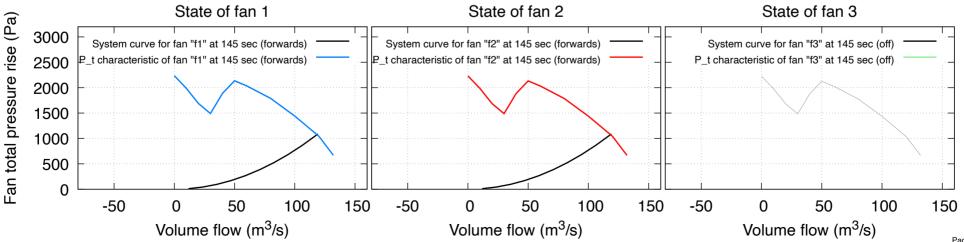
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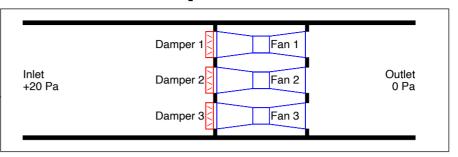
At 40 seconds, fan 1 starts

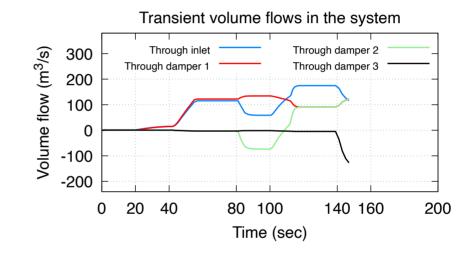
At 80 seconds, damper 2 opens

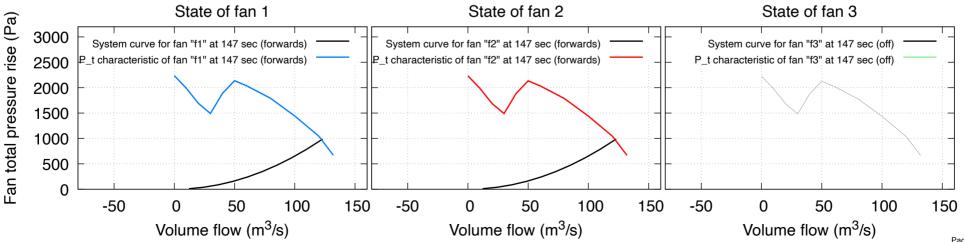
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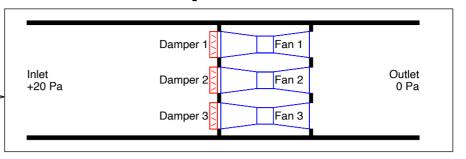
At 40 seconds, fan 1 starts

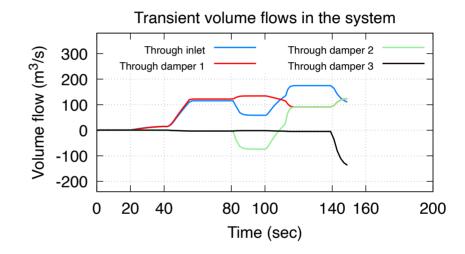
At 80 seconds, damper 2 opens

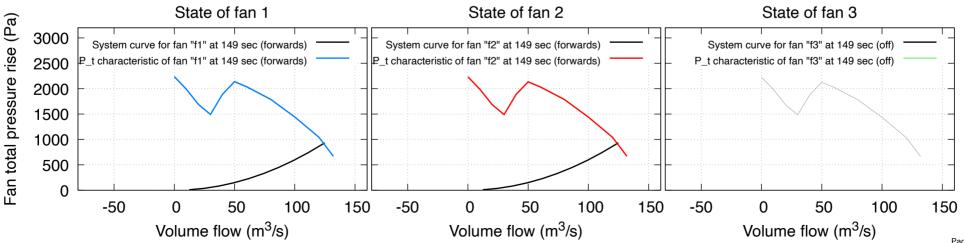
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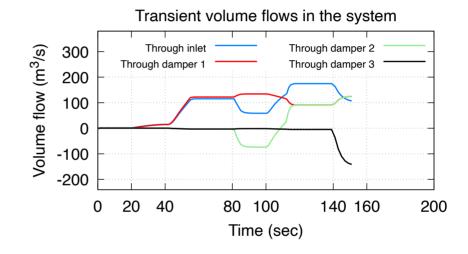
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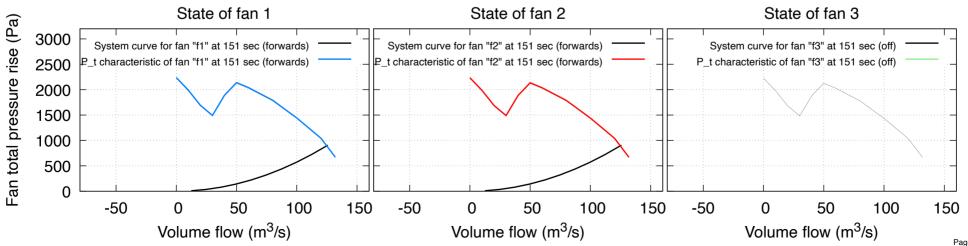
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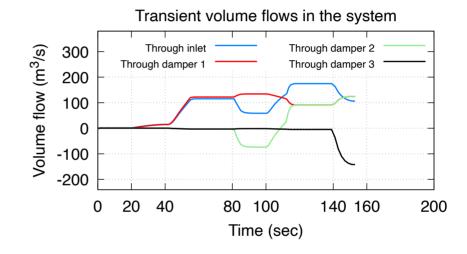
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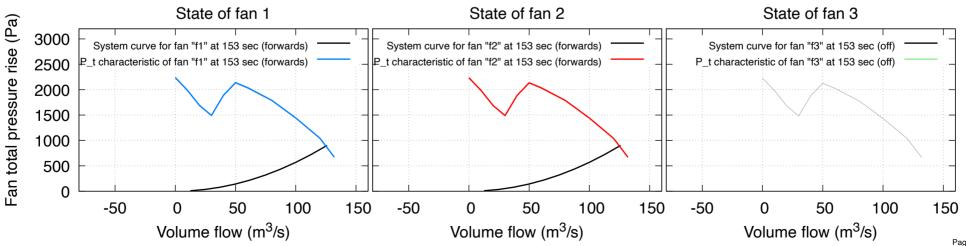
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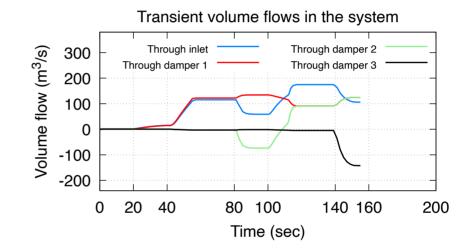
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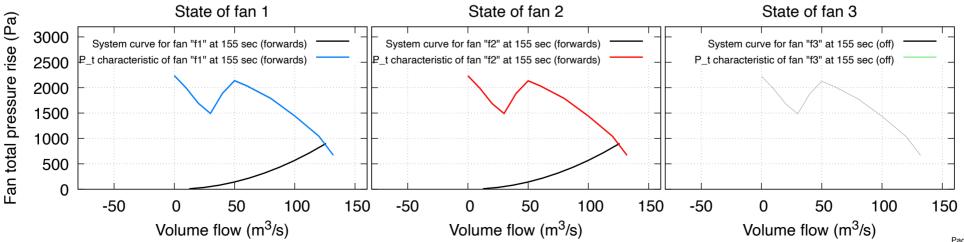
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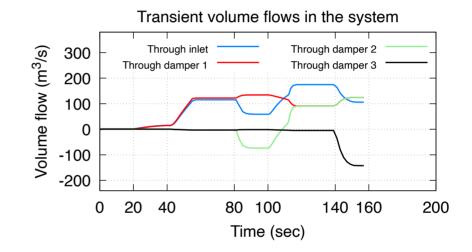
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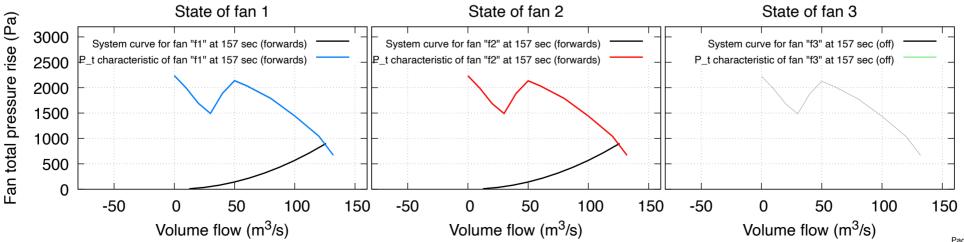
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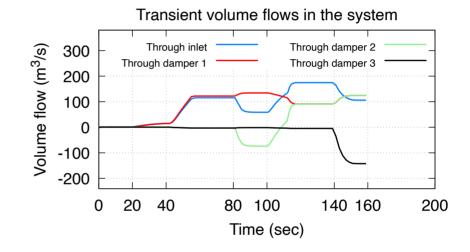
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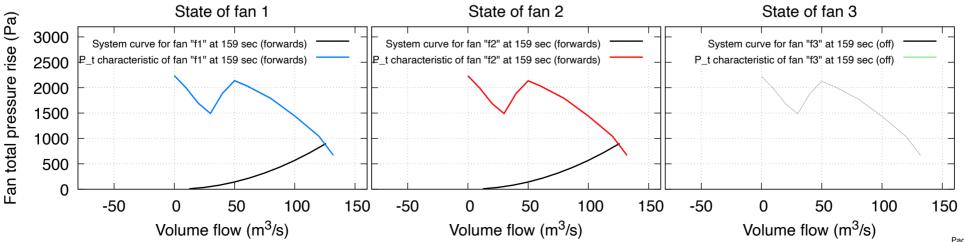
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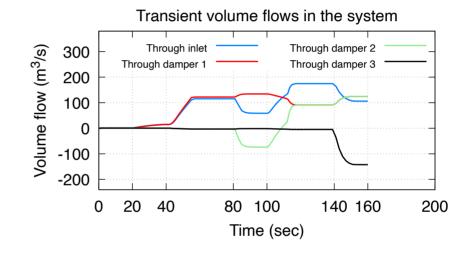
At 80 seconds, damper 2 opens

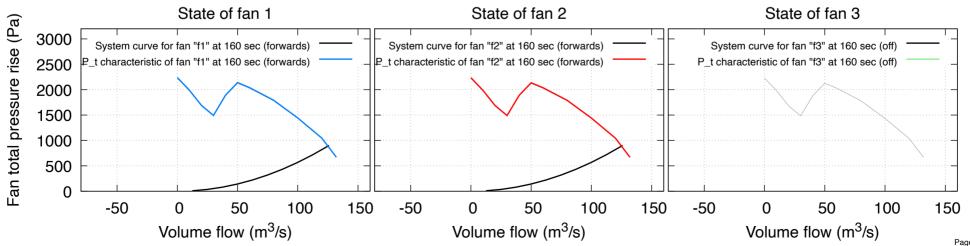
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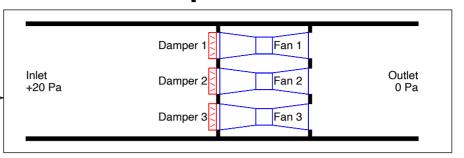
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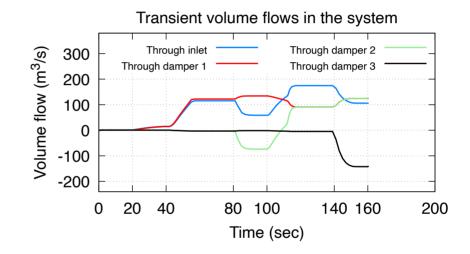
At 80 seconds, damper 2 opens

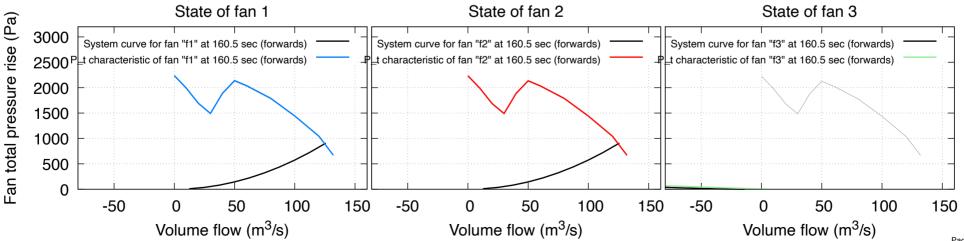
At 100 seconds, fan 2 starts

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Source file: ok-032-fans-in-parallel.txt.



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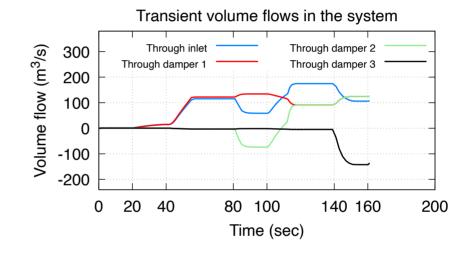
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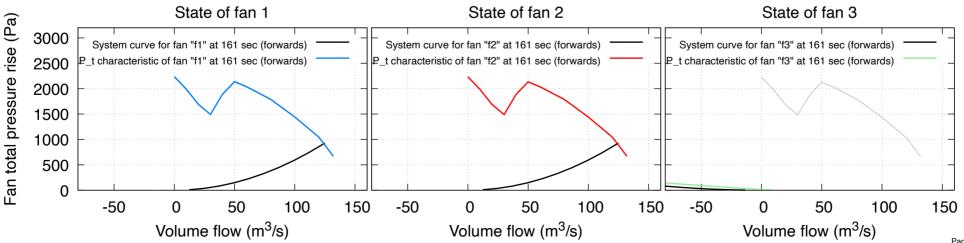
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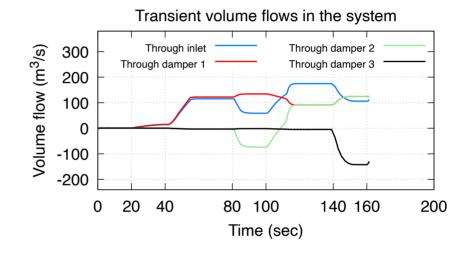
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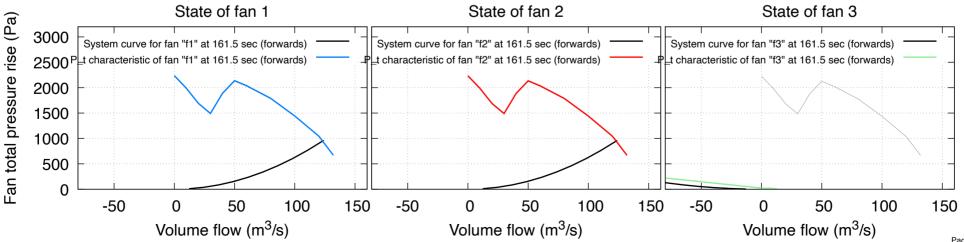
At 100 seconds, fan 2 starts

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Source file: ok-032-fans-in-parallel.txt.

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Created by Hobyah.py from ok-032-fans-in-parallel.txt, 19:30 on 22 Jul 2024 by ecb

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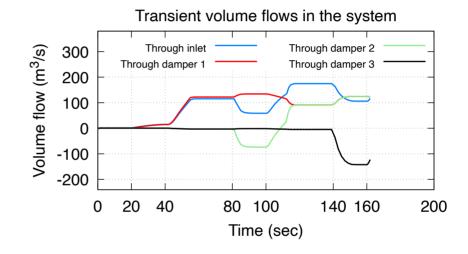
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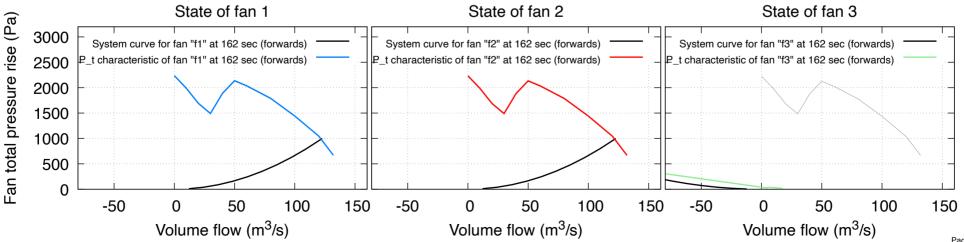
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Project no: 2 Project name: Software testing



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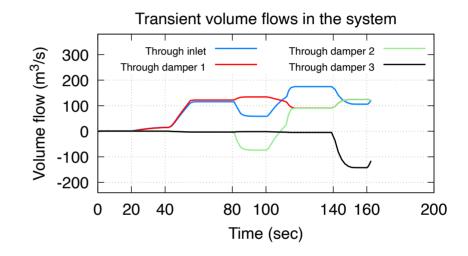
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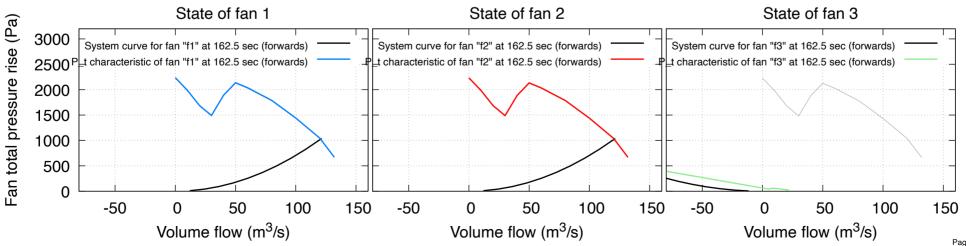
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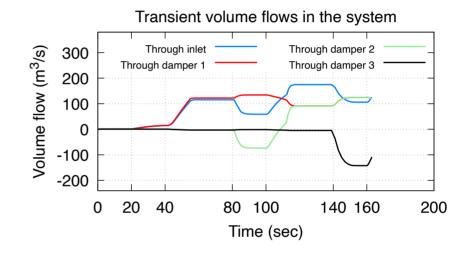
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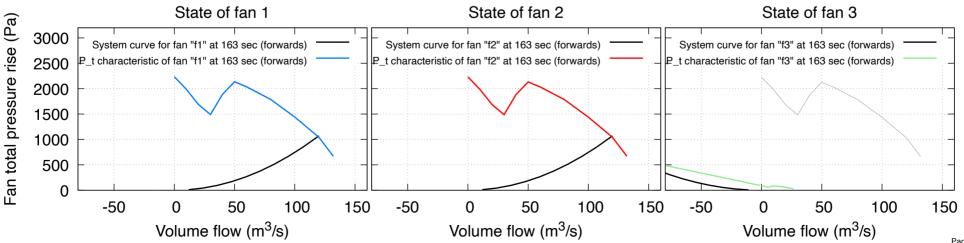
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At 160 seconds, fan 3 starts









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Consider three identical fans with isolation dampers, in parallel:— The fans have a Q-P_{tot} characteristic with a bad stall hump.

The fans are started sequentially. Fans 1 and 2 get to suitable parts of their characteristics. Fan 3 can't get out of stall.

At 20 seconds, damper 1 opens

At 40 seconds, fan 1 starts

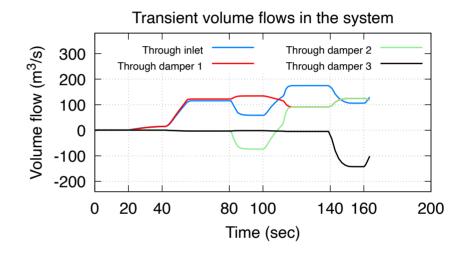
At 80 seconds, damper 2 opens

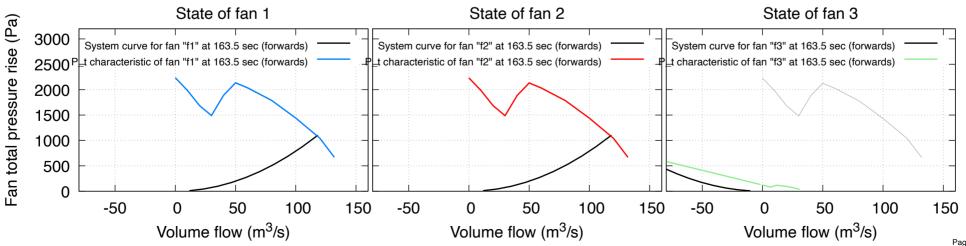
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

At 160 seconds, fan 3 starts









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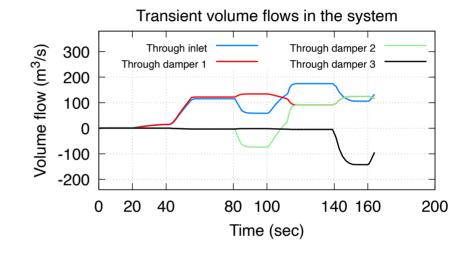
At 80 seconds, damper 2 opens

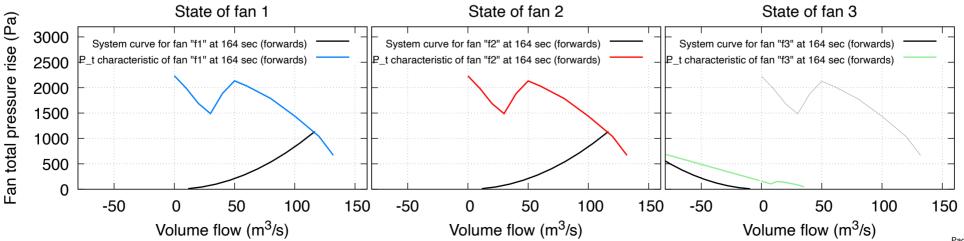
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

At 160 seconds, fan 3 starts







Source file: ok-032-fans-in-parallel.txt.



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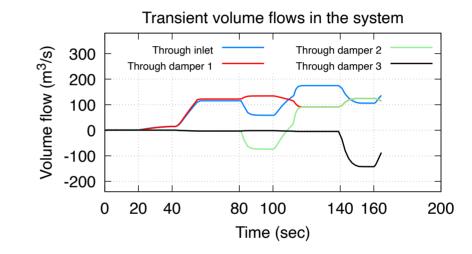
At 80 seconds, damper 2 opens

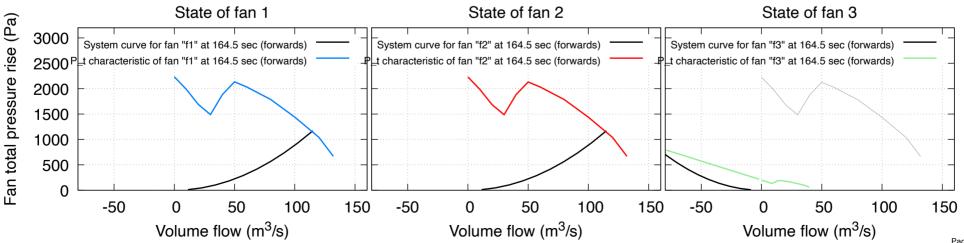
At 100 seconds, fan 2 starts

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At 160 seconds, fan 3 starts







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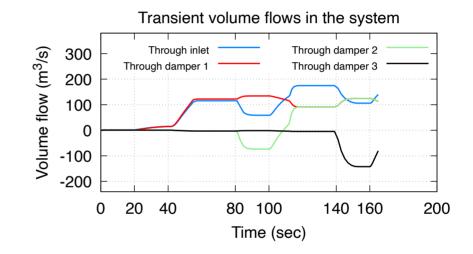
At 80 seconds, damper 2 opens

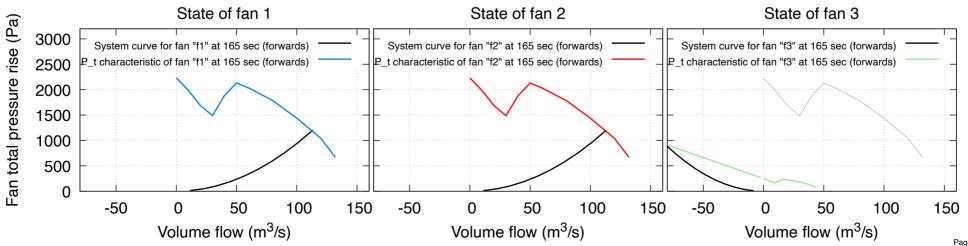
At 100 seconds, fan 2 starts

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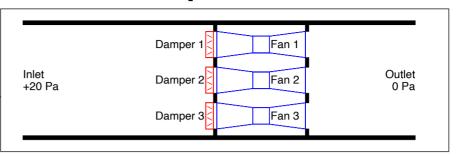
At 40 seconds, fan 1 starts

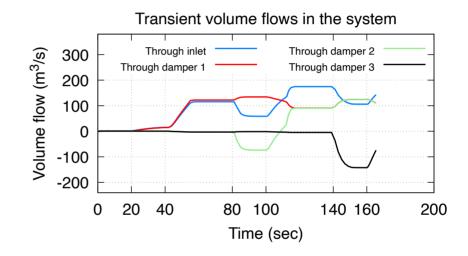
At 80 seconds, damper 2 opens

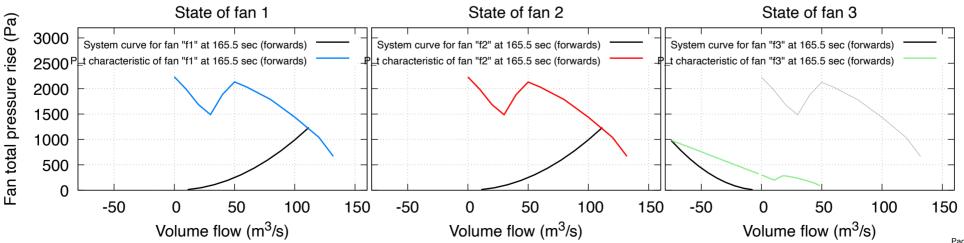
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

At 160 seconds, fan 3 starts







Source file: ok-032-fans-in-parallel.txt.

J

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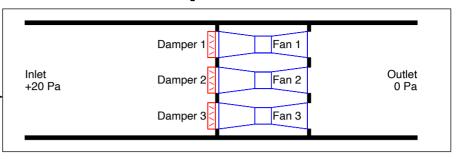
At 40 seconds, fan 1 starts

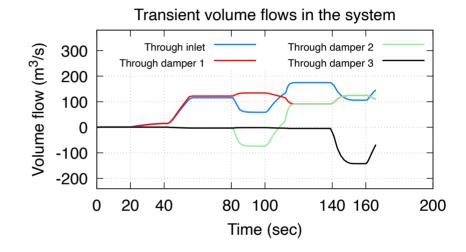
At 80 seconds, damper 2 opens

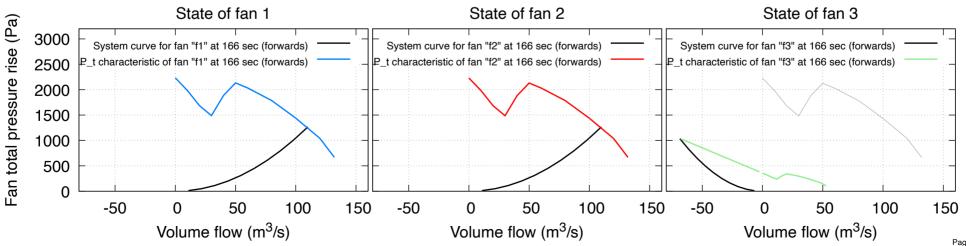
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

At 160 seconds, fan 3 starts







Source file: ok-032-fans-in-parallel.txt.



Created by Hobyah.py from ok-032-fans-in-parallel.txt, 19:30 on 22 Jul 2024 by ecb

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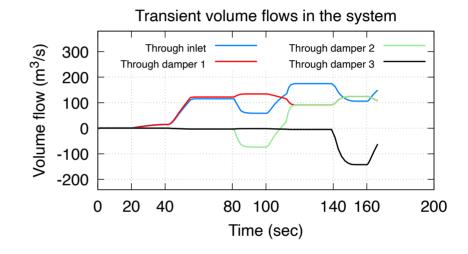
At 80 seconds, damper 2 opens

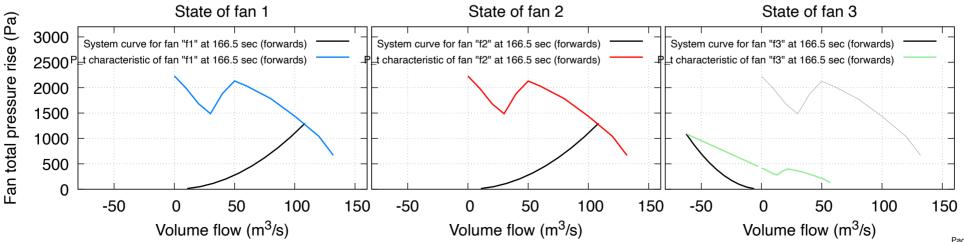
At 100 seconds, fan 2 starts

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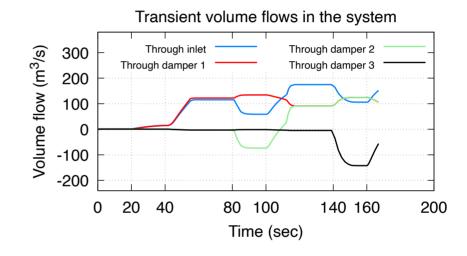
At 80 seconds, damper 2 opens

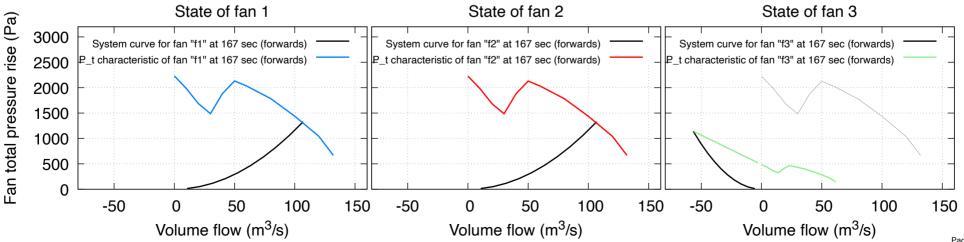
At 100 seconds, fan 2 starts

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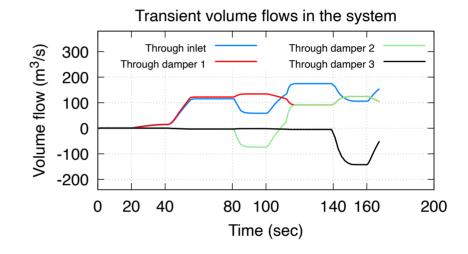
At 80 seconds, damper 2 opens

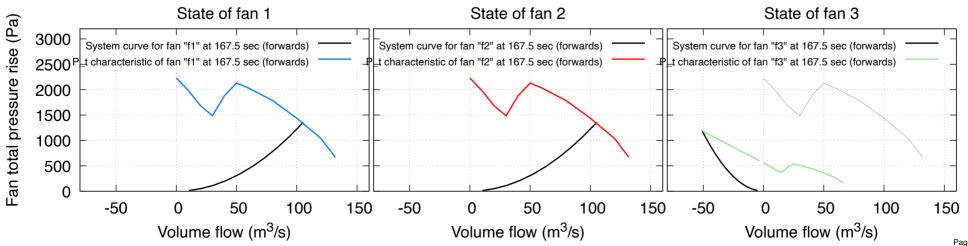
At 100 seconds, fan 2 starts

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Source file: ok-032-fans-in-parallel.txt.

Project no: 2 Project name: Software testing



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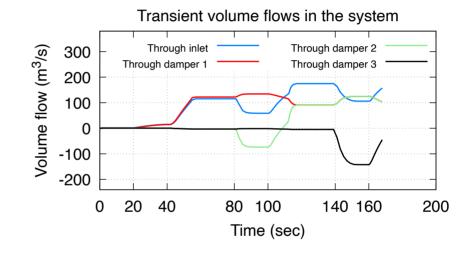
At 80 seconds, damper 2 opens

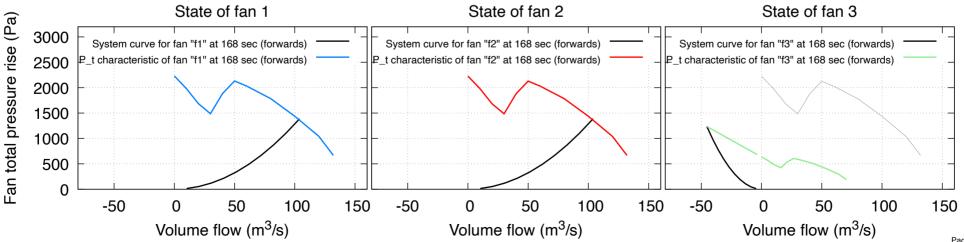
At 100 seconds, fan 2 starts

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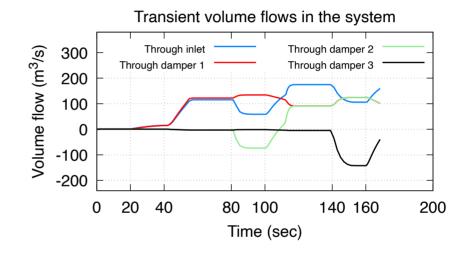
At 80 seconds, damper 2 opens

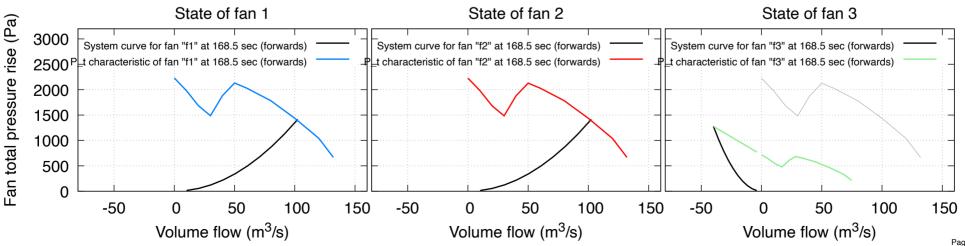
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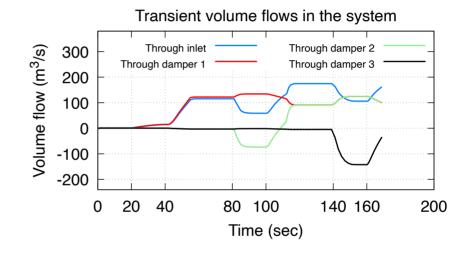
At 80 seconds, damper 2 opens

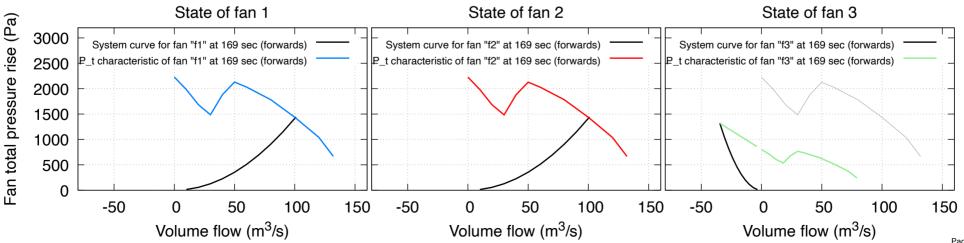
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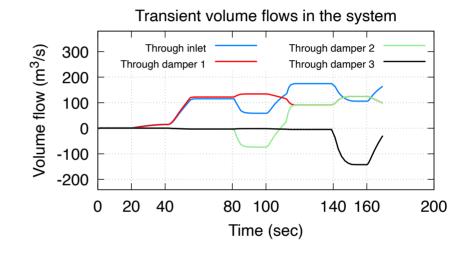
At 80 seconds, damper 2 opens

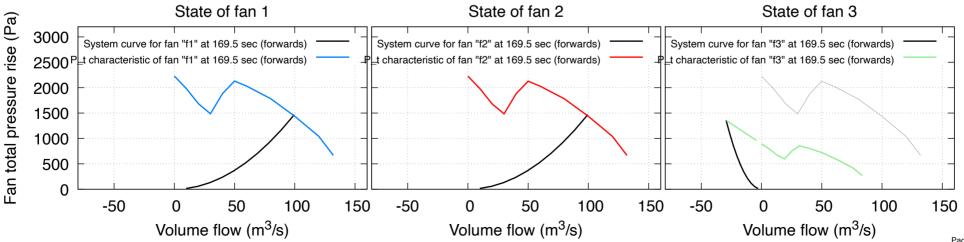
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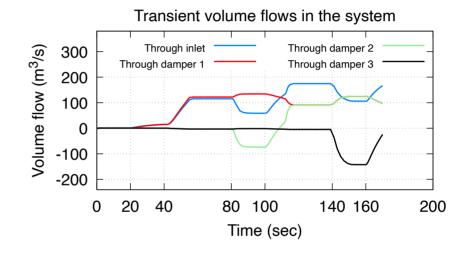
At 80 seconds, damper 2 opens

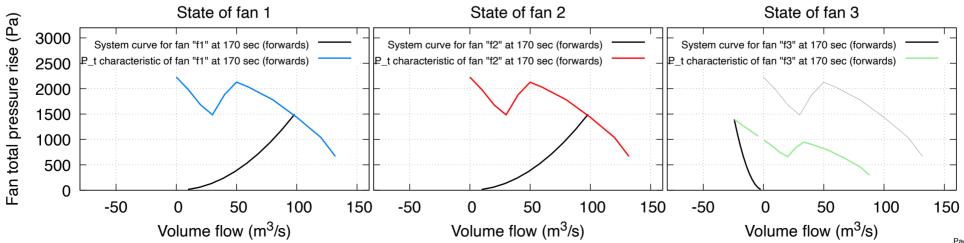
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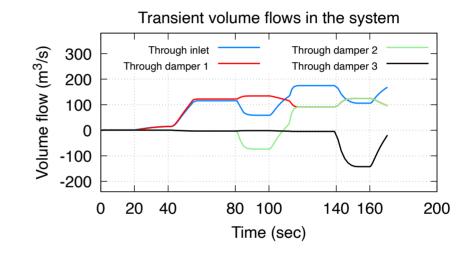
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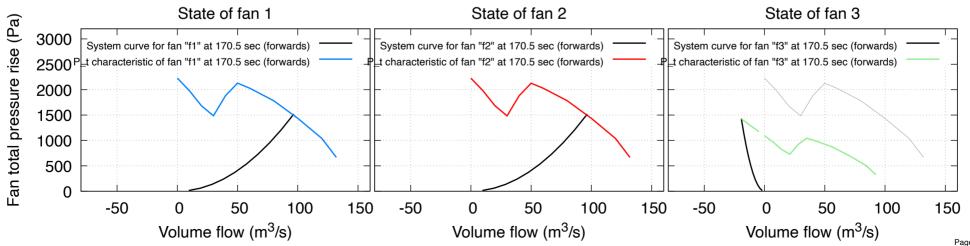
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Source file: ok-032-fans-in-parallel.txt.

Project no: 2 Project name: Software testing



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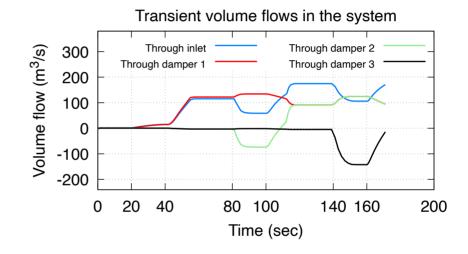
At 80 seconds, damper 2 opens

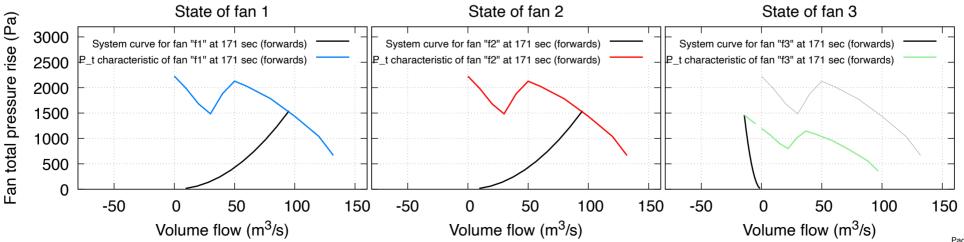
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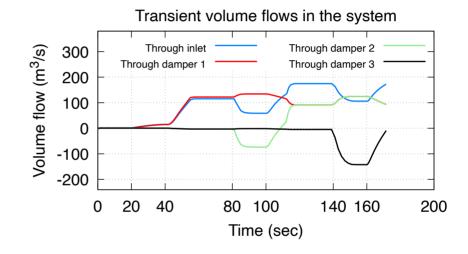
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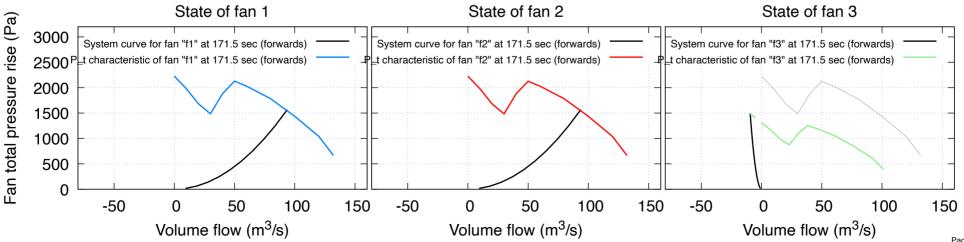
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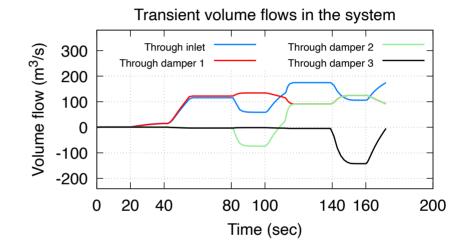
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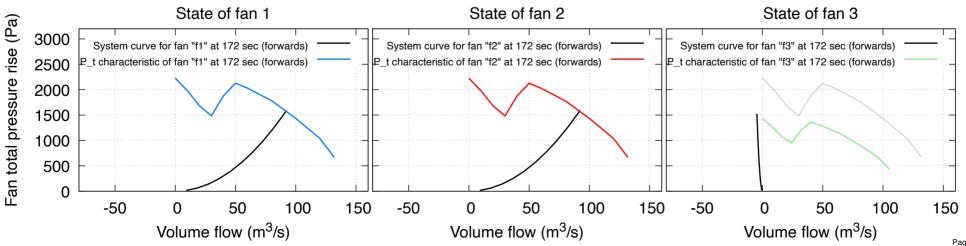
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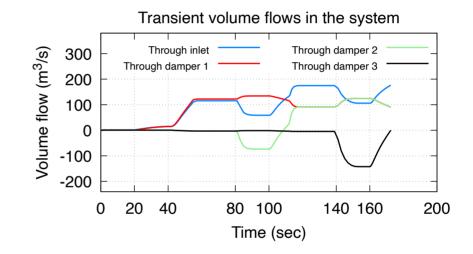
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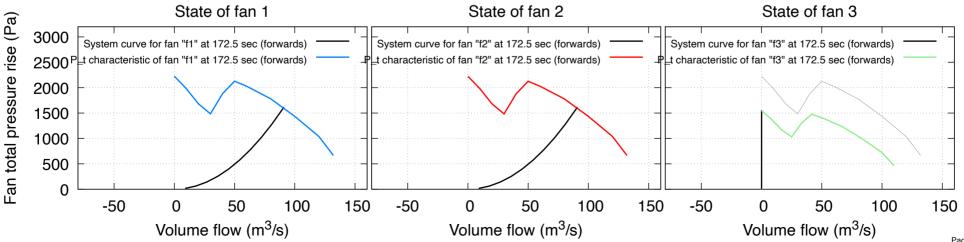
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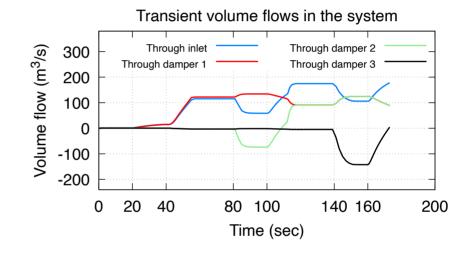
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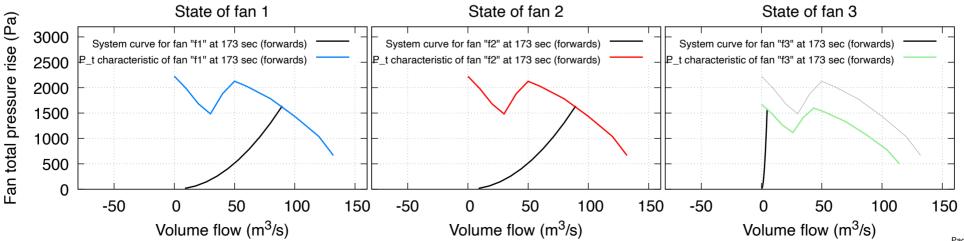
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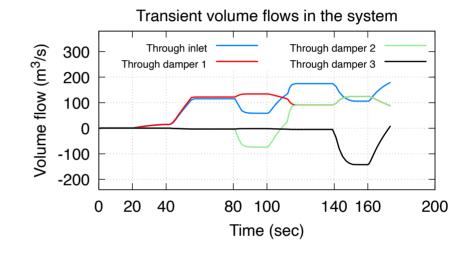
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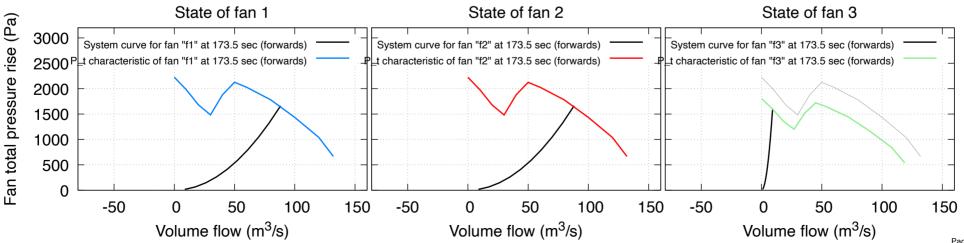
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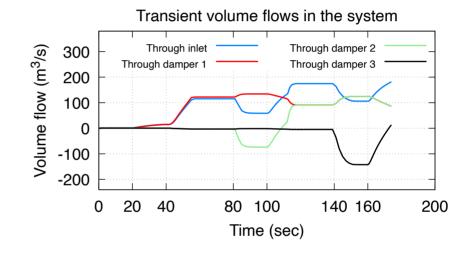
At 80 seconds, damper 2 opens

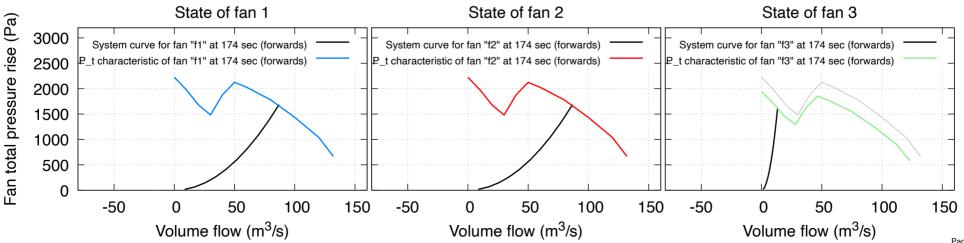
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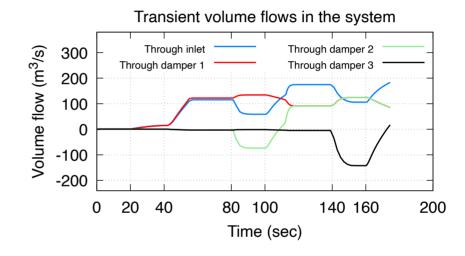
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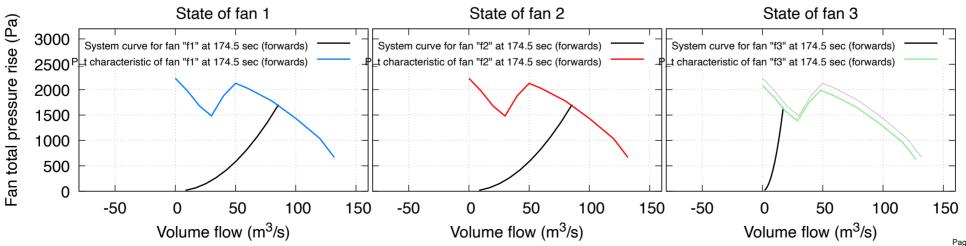
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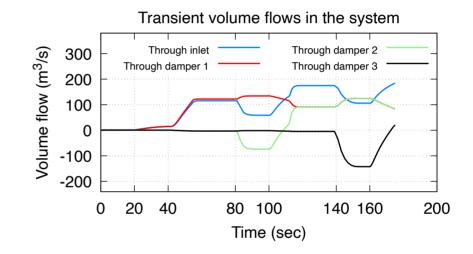
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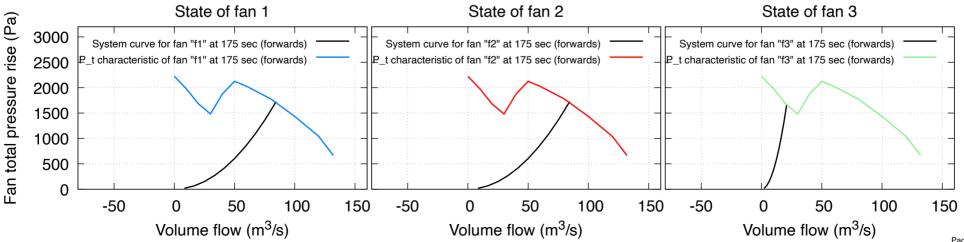
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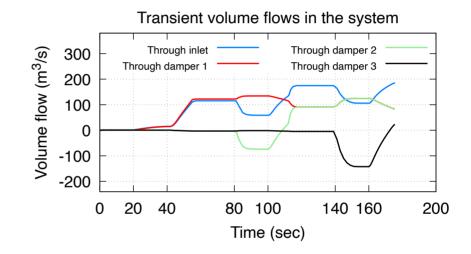
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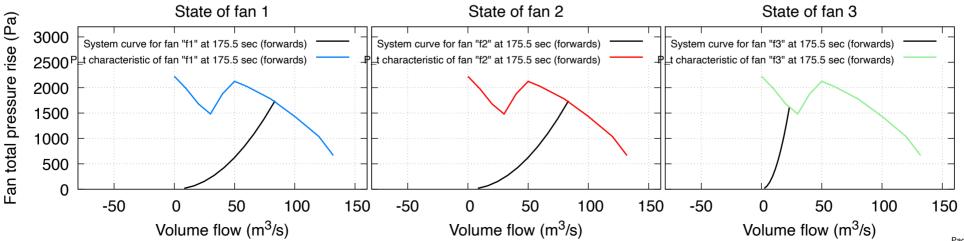
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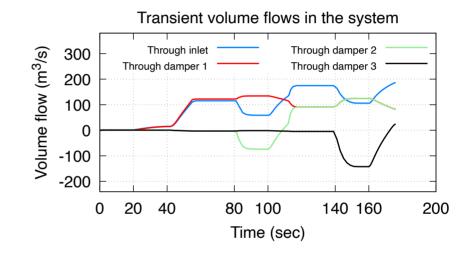
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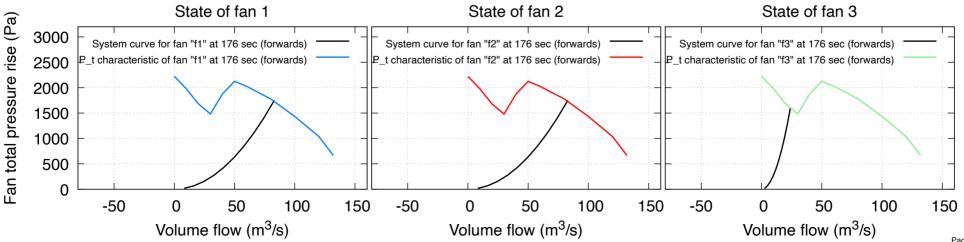
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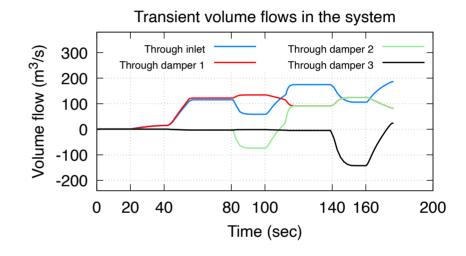
At 80 seconds, damper 2 opens

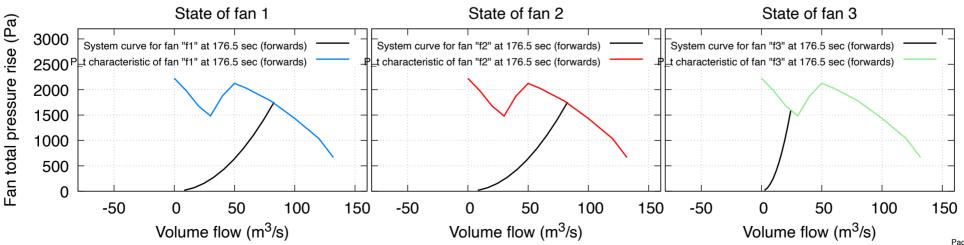
At 100 seconds, fan 2 starts

At 140 seconds, damper 3 opens

At 160 seconds, fan 3 starts









This flipbook illustrates a problem that can occur when you try to run fans in parallel that are unsuitable for running in parallel.

Consider three identical fans with isolation dampers, in parallel:— The fans have a Q-P_{tot} characteristic with a bad stall hump.

The fans are started sequentially. Fans 1 and 2 get to suitable parts of their characteristics. Fan 3 can't get out of stall.

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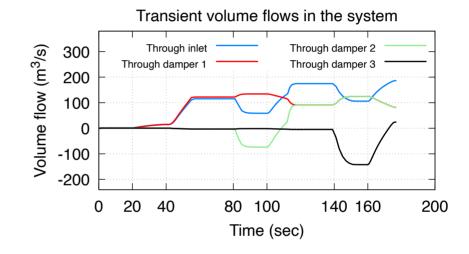
At 80 seconds, damper 2 opens

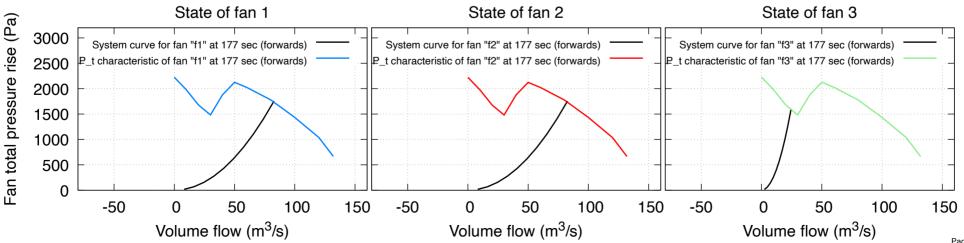
At 100 seconds, fan 2 starts

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Source file: ok-032-fans-in-parallel.txt.



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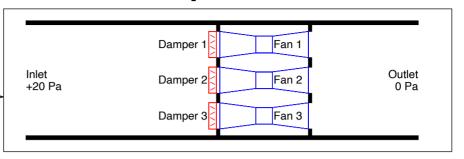
At 40 seconds, fan 1 starts

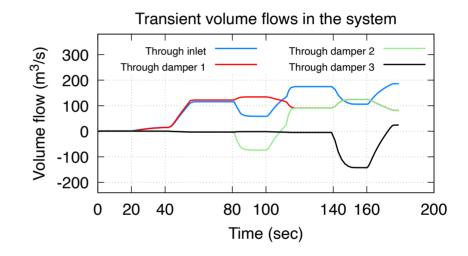
At 80 seconds, damper 2 opens

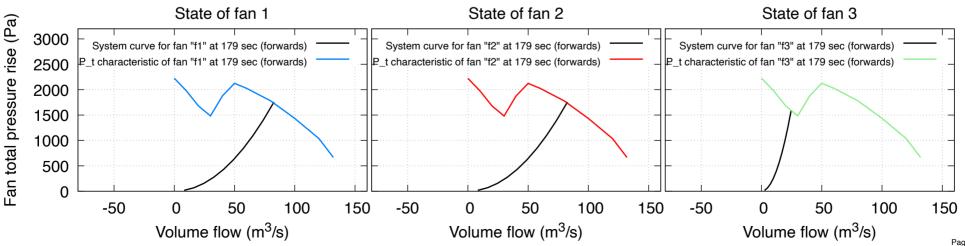
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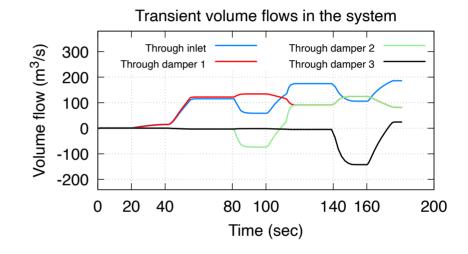
At 80 seconds, damper 2 opens

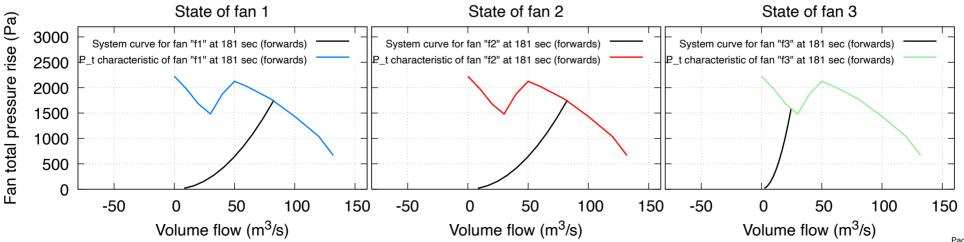
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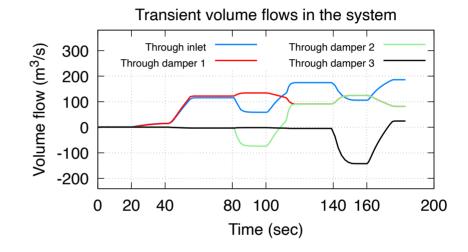
At 80 seconds, damper 2 opens

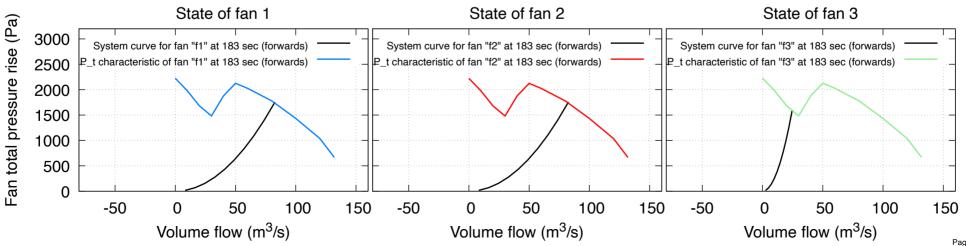
At 100 seconds, fan 2 starts

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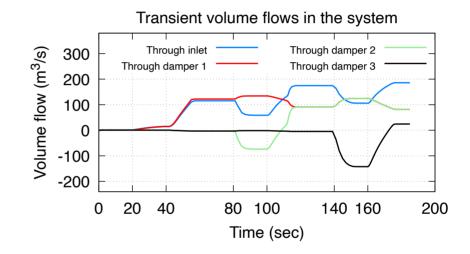
At 80 seconds, damper 2 opens

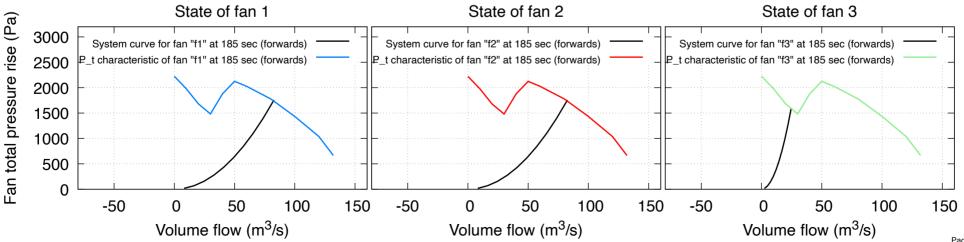
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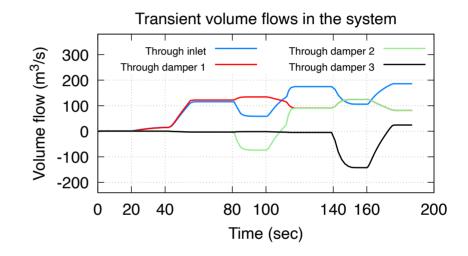
At 80 seconds, damper 2 opens

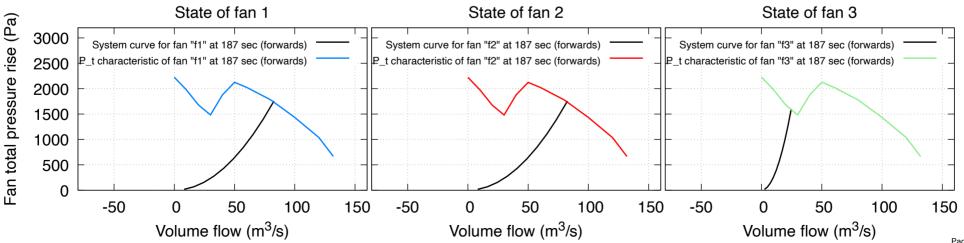
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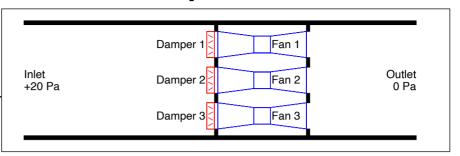
At 40 seconds, fan 1 starts

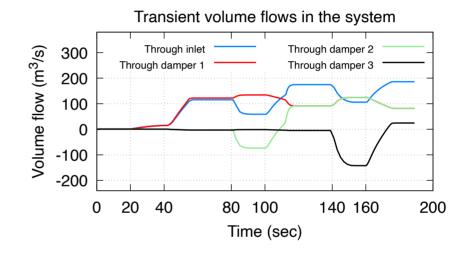
At 80 seconds, damper 2 opens

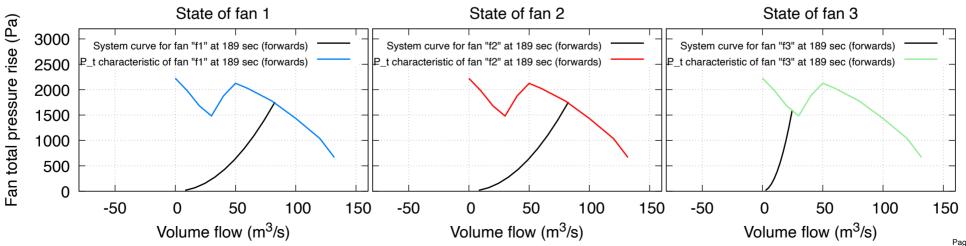
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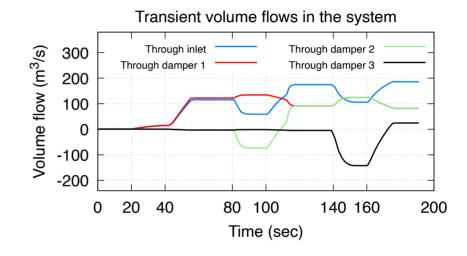
At 80 seconds, damper 2 opens

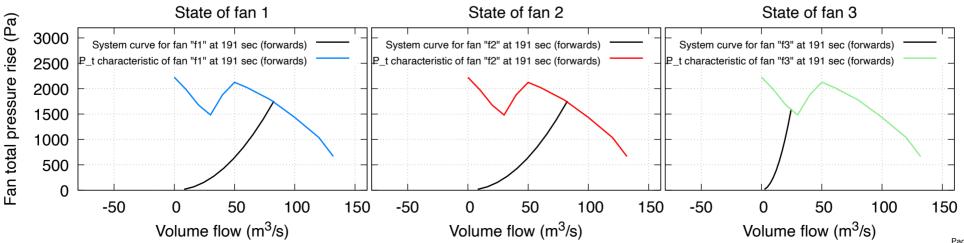
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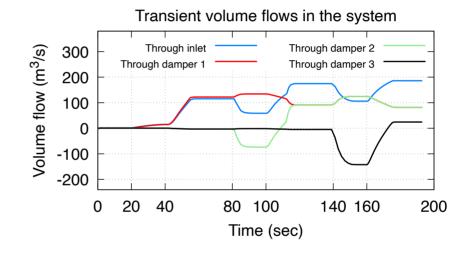
At 80 seconds, damper 2 opens

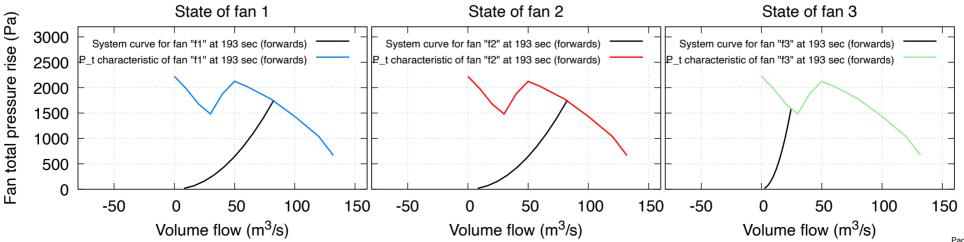
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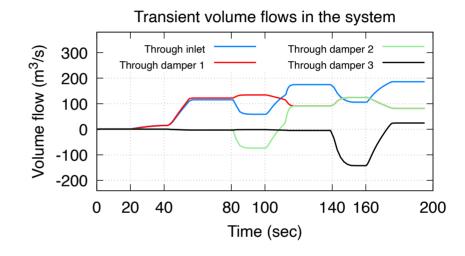
At 80 seconds, damper 2 opens

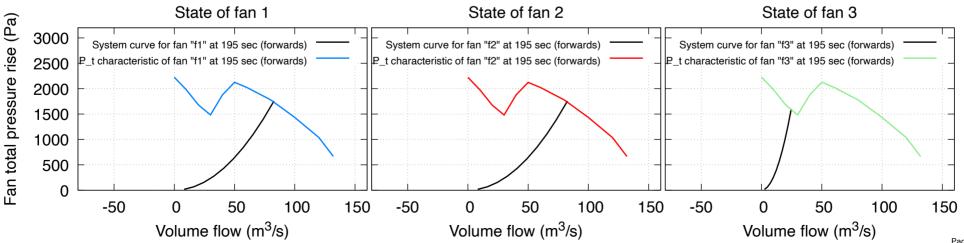
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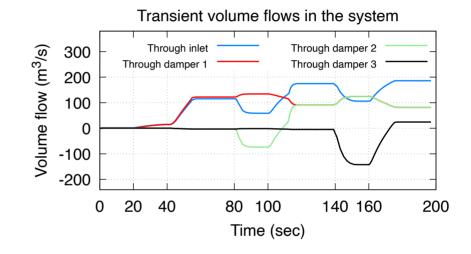
At 80 seconds, damper 2 opens

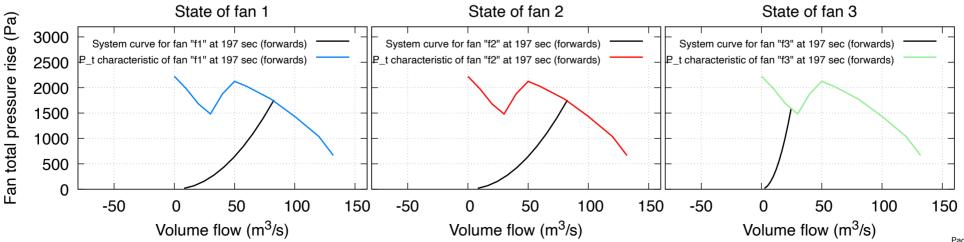
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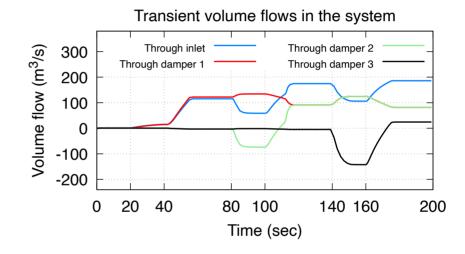
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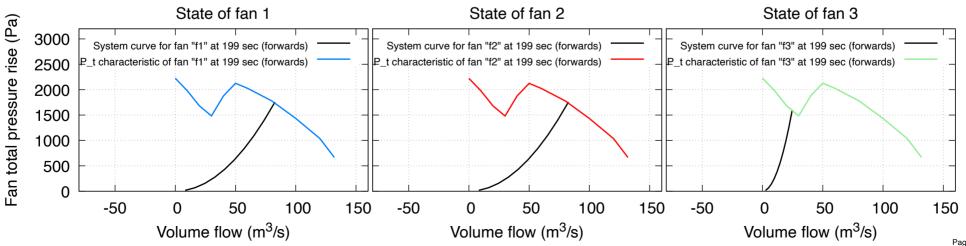
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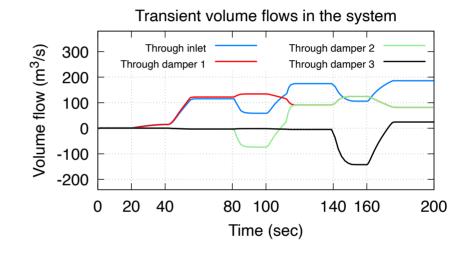
At 80 seconds, damper 2 opens

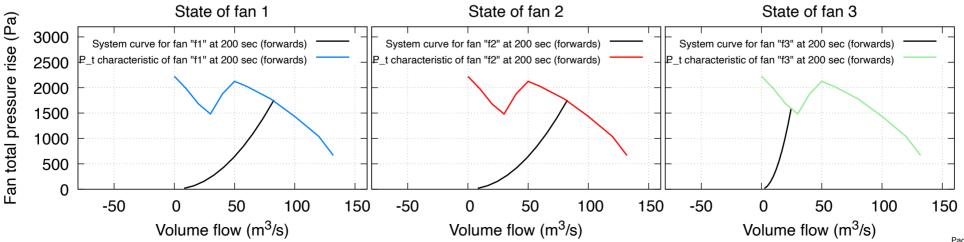
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