# Numerical Experiments with Wes's Program June 11, 2007

These figures correspond to "Fixed period pacing, homogeneous loop" described in Hassan's SITR website. Here, the APD restitution function is

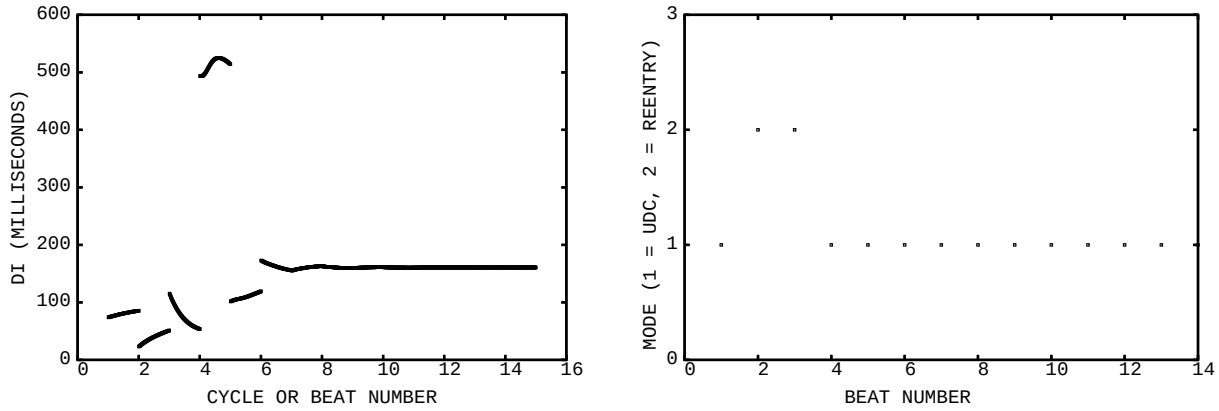
$$f(t) = a - be^{-\sigma t} + pe^{-\gamma(t-\tau)^2} + \frac{(\text{new c})(t - \text{new d})}{(t - \text{new d})^2 + \text{new k}} - 8e^{-0.025(t-80)}.$$

DEFAULT PARAMETERS:

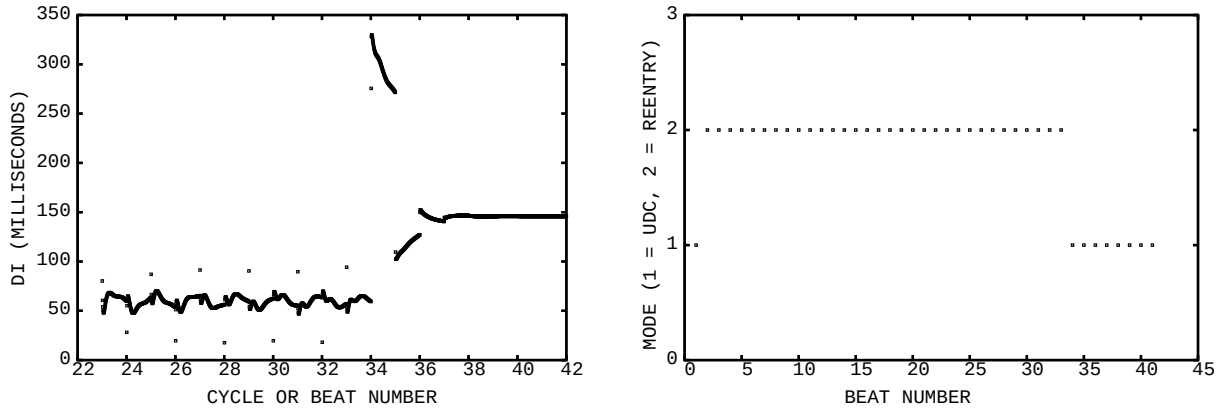
| Quantity | a | b | $\sigma$ | p | $\gamma$ | $\tau$ | new c | new d | new k |
|---|---|---|---|---|---|---|---|---|---|
| Value | 350 | 157 | 0.0021 | -20 | 0.0004 | 136 | 1700 | 82 | 1200 |

| Quantity | c | d | $\Delta$L | $\omega$ | $\alpha$ | s | $DI^*$ | $DI^{**}$ | $B_n$ | $\delta_2$ | $\delta_1$ | m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Value | 0.07 | 1.0 | 0.125 | 0.02 | 0.0 | 0.05 | 15.4176 | 171.699 | 400 | 120 | 16 | 100 |

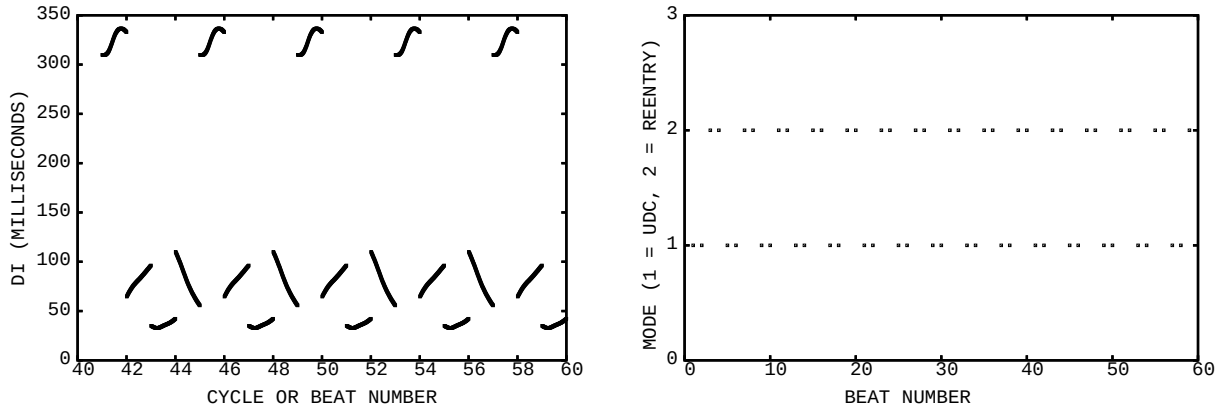
Above, $\delta_2$ was the $\delta$-value associated with reentry and $\delta_1$ was the $\delta$-value associated with UDC mode. Although $\delta_1$ was set to 16, it will be convenient to let it equal $DI^*$ in future simulations. *Initial DI was 100 in all cells unless otherwise indicated.*



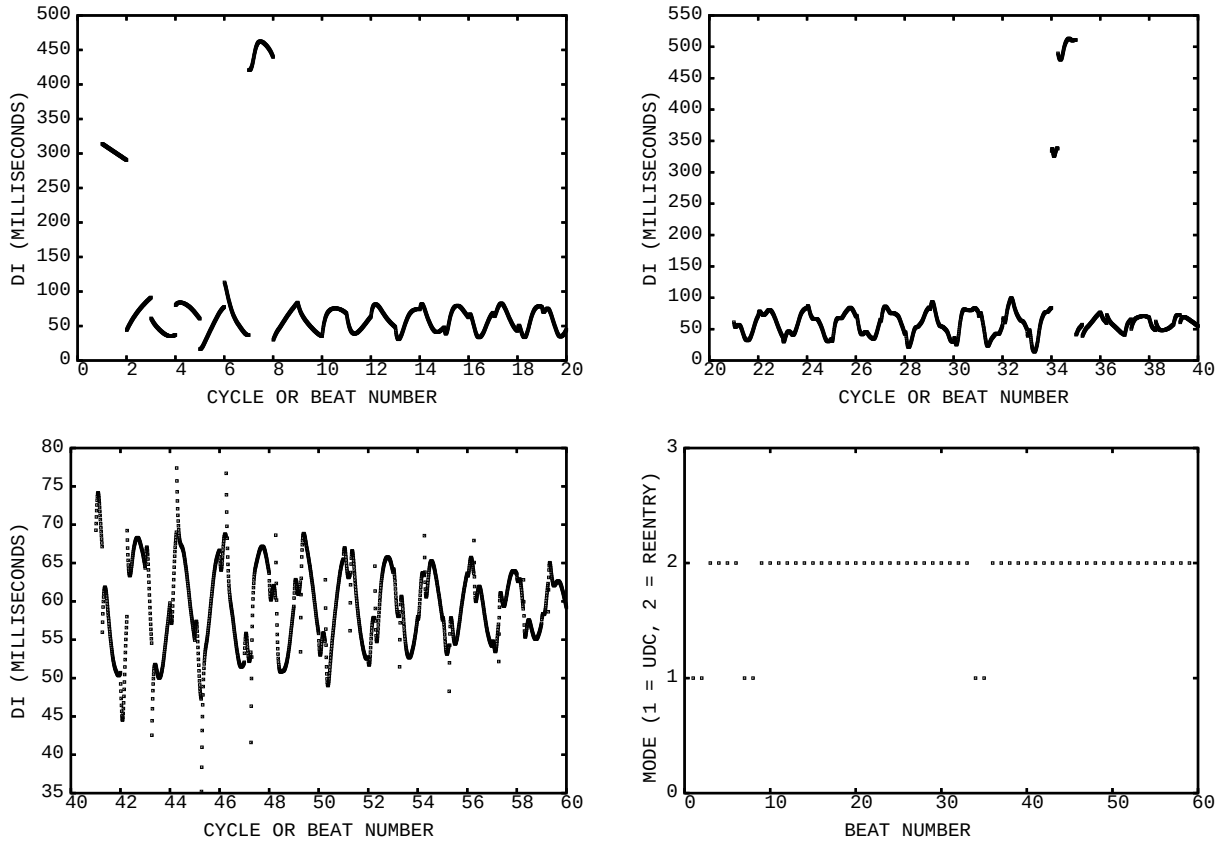

**Run 1.1:** Default parameters. Two beats of reentry followed by steady UDC.



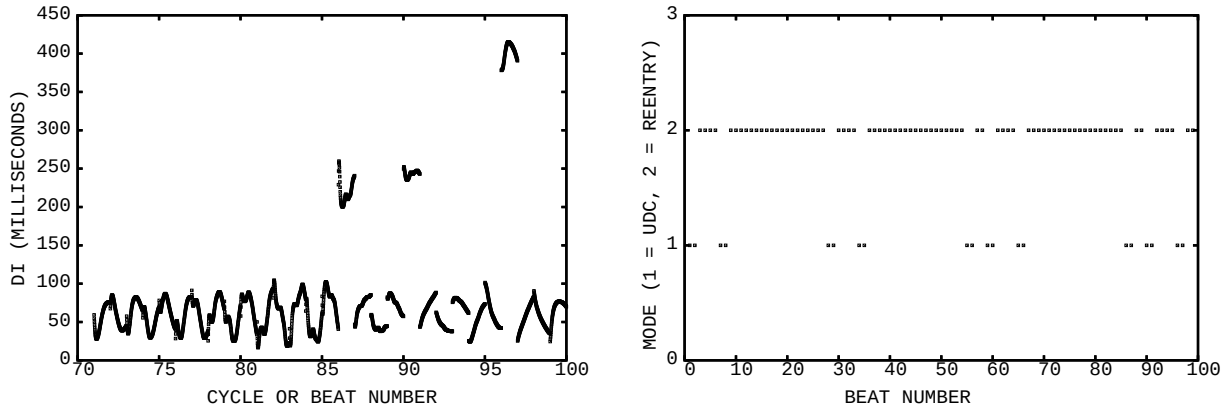

**Run 1.2:** $B_n$ reduced to 380. Reentry terminated in beat 34, Cell 1 due to failure of T4.



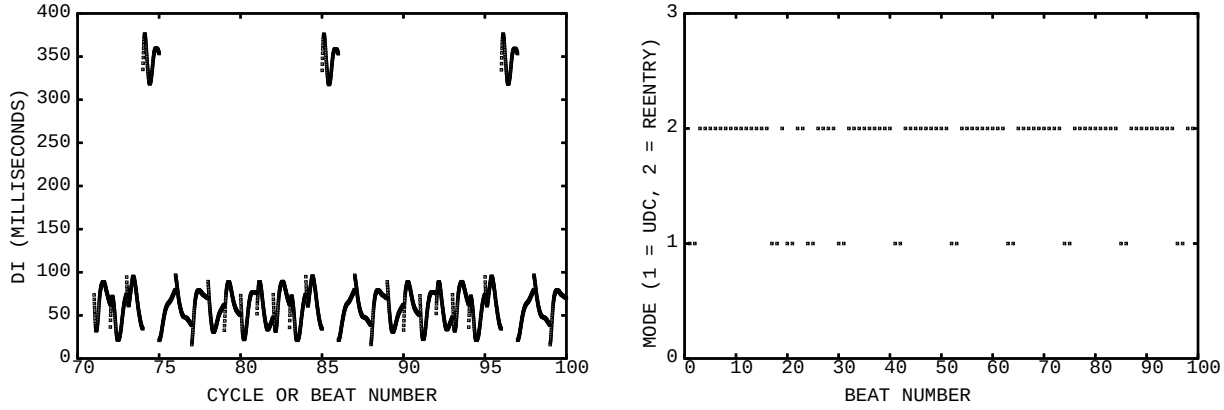

**Run 1.5:** $B_n = 340$. Alternating pattern of 2 reentrant beats, 2 UDC beats.



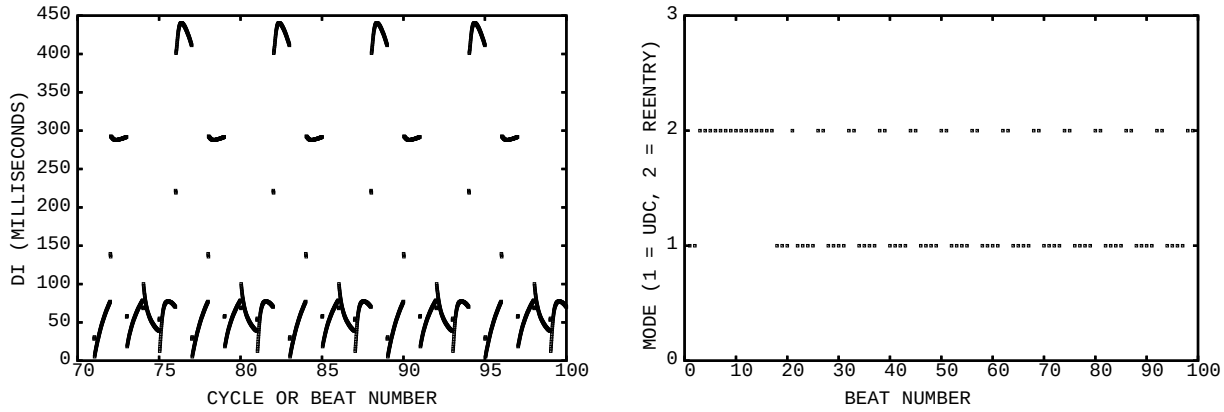

**Run 1.6:** $B_n = 320$. (a) Beats 1 through 20. (b) Beats 21 through 40. (c) Beats 41 through 60. Reentry sustained from Beat 36 onward, and all DI values tend to 59.3845.




**Run 1.7:** $B_n = 310$. Reentry occasionally interrupted by UDC beats.

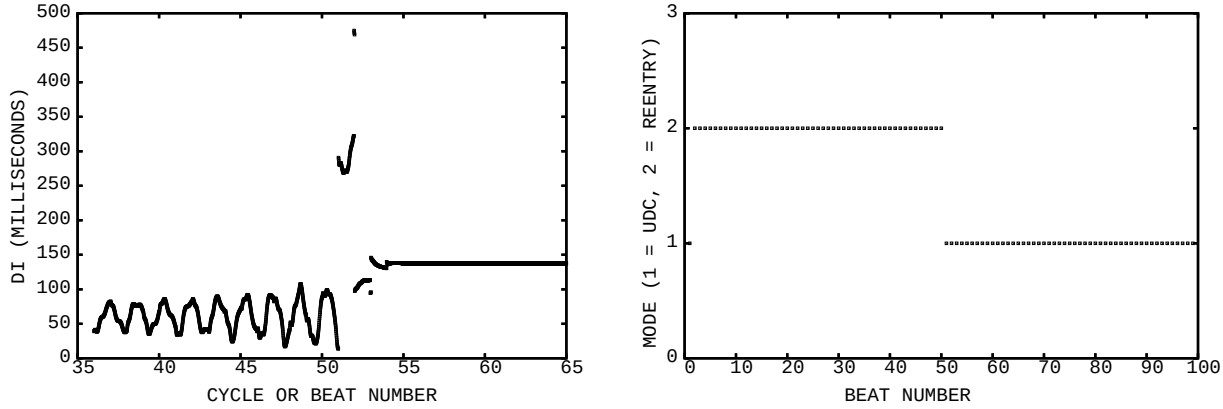



**Run 1.8:** $B_n = 300$. Eventual pattern of 9 reentrant beats, 2 UDC beats.

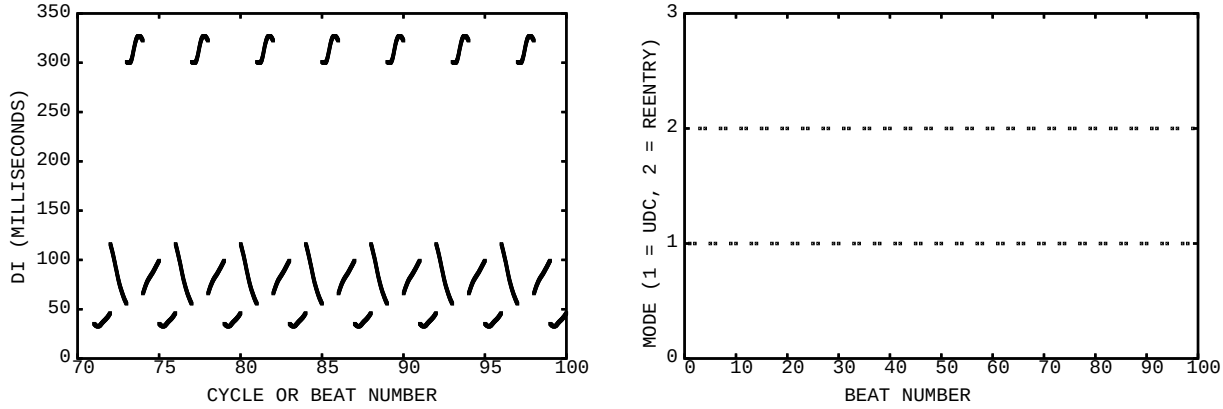



**Run 1.9:** $B_n = 290$. Strange pattern of several reentrant beats, UDC mode, and UDC mode conduction block.

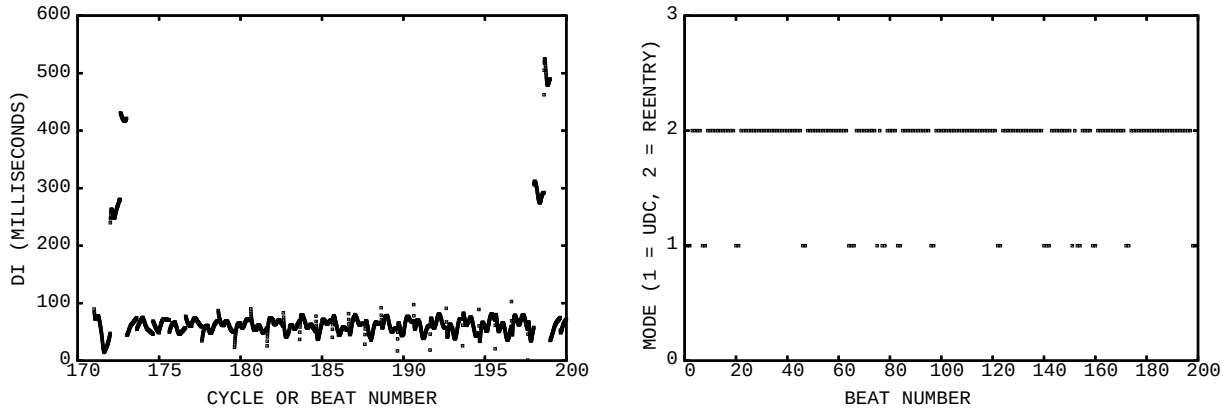
**In Runs 2.#, the parameter $d$ has been changed from default value of 1.0 to 1.1.**



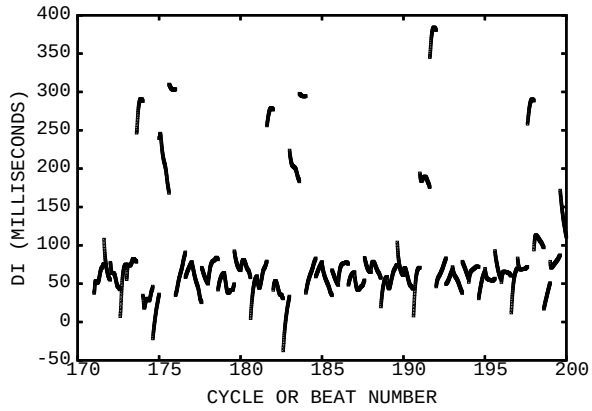

**Run 2.1:** $B_n = 370$. Reentry terminated in Beat 50, Cell 97 due to failure of T4.

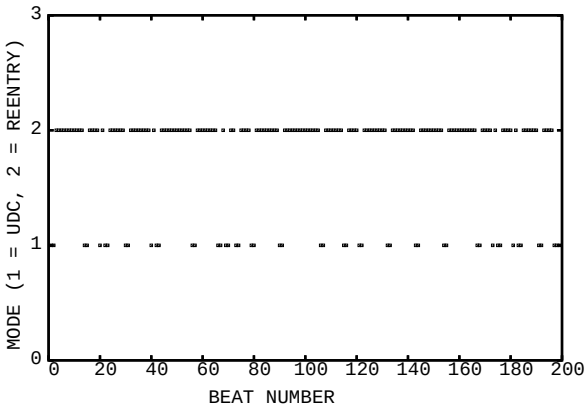



**Run 2.2:** $B_n = 340$. Alternating pattern of two beats reentry, two beats UDC.

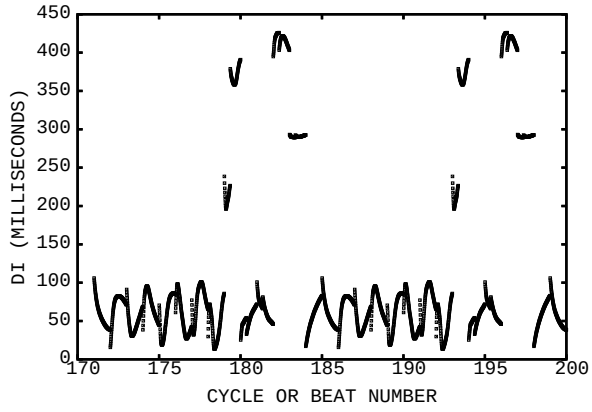


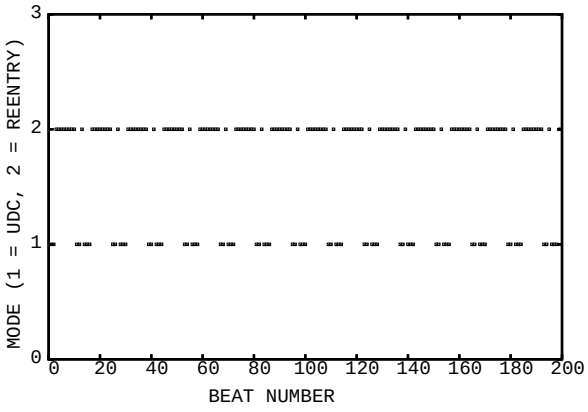

**Run 2.3:** $B_n = 310$. Pattern repeats approximately every 75 beats.



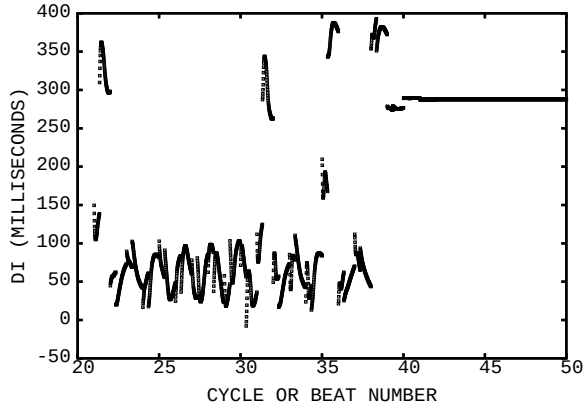



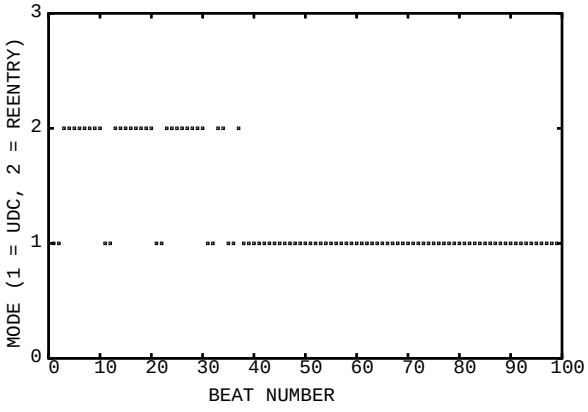

**Run 2.4:** $B_n = 300$.



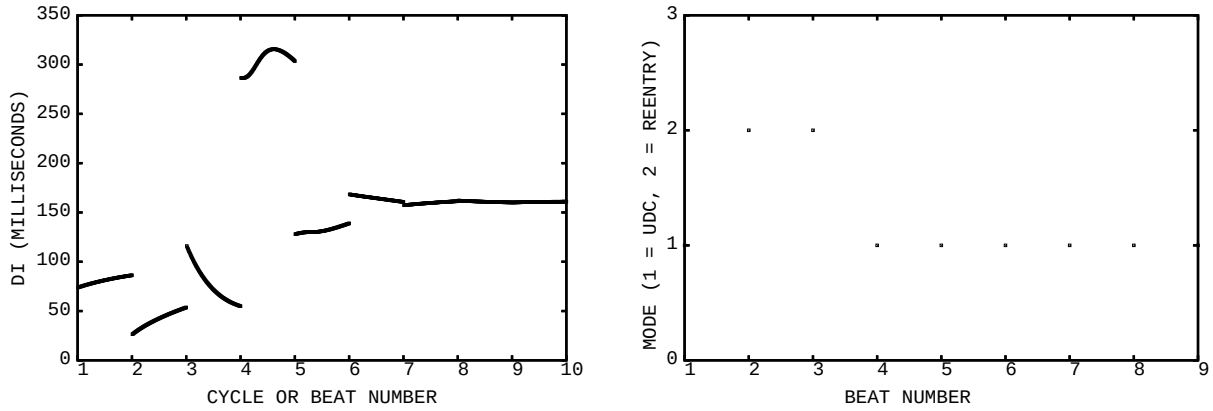




**Run 2.5:** $B_n = 290$.




**Run 2.6:** $B_n = 280$. Reentry terminated in Beat 38. *Seems to lead to a 2:1 UDC response (note the larger steady-state DI).*




**Run 2.7:** $B_n = 200$. Sustained UDC after a brief initial transient.

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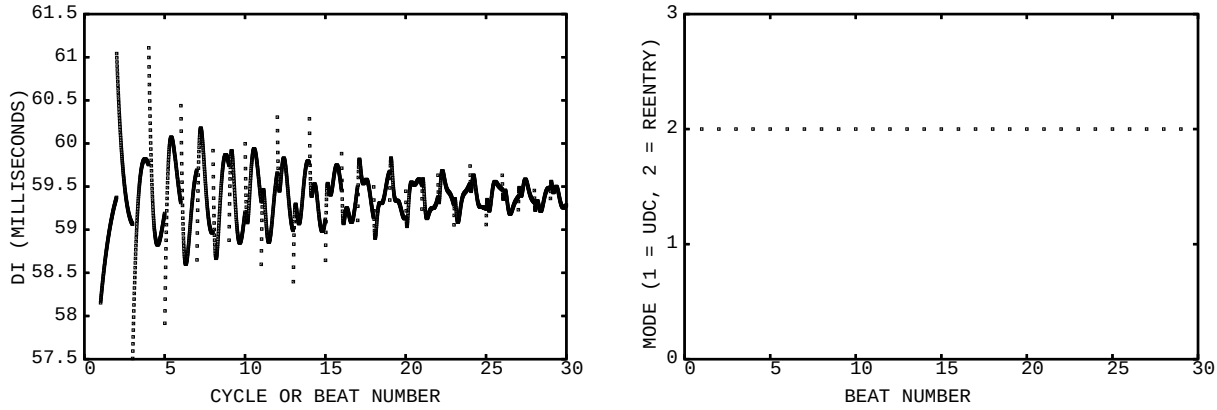
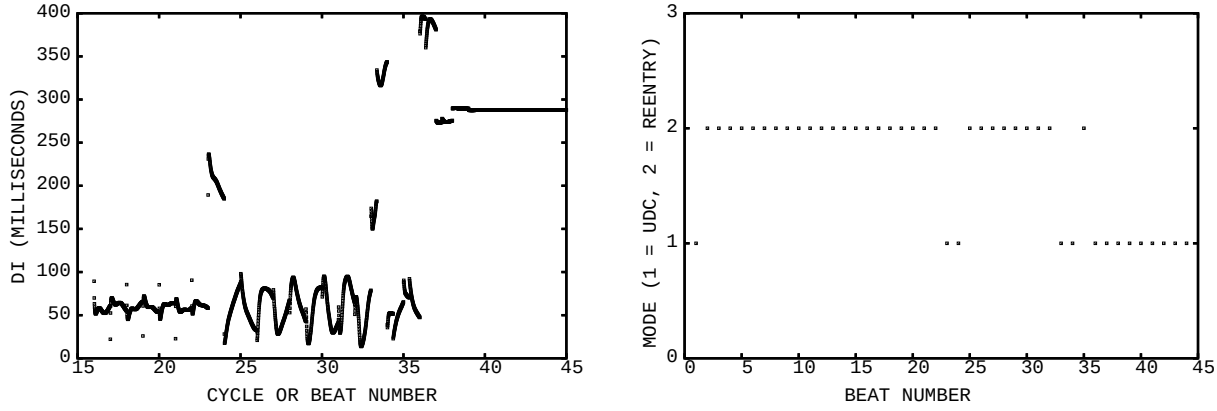
**In Runs 3.#, we again work from default parameters, but use initial DI of 60 in each cell**




**Run 3.1:** $B_n = 400$. Reentry sustained, and all DI values tend to 59.3845.




**Run 3.3:** $B_n = 280$. Reentry terminates in Beat 36, Cell 1 due to failure of T4, leading to steady UDC.

The other Runs 3.# didn't generate figures that were very interesting.