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A general program with spirals in parallel including repetition of the parallel pattern through twinning

The development of the original design of the flocculator was the start of a search directed to further investigations of problems in the field of the water and sewage treatment, since primarily, a flocculator is a device which optimizes a process of chemical nature through a treatment requiring minimal use of energy.
In other words, with the dissipation of a small hydraulic head, inside the flocculator, we can avoid the use of mechanical plant.

The formula developed here below (which can be deployed into a program) is an advancement of the original one developed and mentioned in Ruggeri36 and can accommodate any number of spiral sections in "parallel" and in "twinning" with the option to choose individually the section character (conventional, inverted, or constant) and in practice any configuration chosen can be joined with its mirror image etc….
The basic formulations necessary for the development of the program are shown below (see also Ruggeri36 where the preliminary formulation for a single segment of spiral (k=1, tw=1) were introduced):

For:

$$2 \le J \le K \quad \text{and} \quad tw = 1,2,3,4\ldots..$$

Note: in the expressions below in place of a and b as minimum and maximum width of the spiral flume is used T_0 and T_N ,

$$N = \operatorname{int}\left\{\frac{c}{\pi}\ln\left(\frac{\bar{\rho}_N - A}{B}\right)\right\}$$

$$e^{\frac{\left(N-\frac{2}{tw}\right)\frac{\pi}{CK}}{}} = \frac{\sum_{J=2}^{K} W_{N,(J-1,J)} + T_N}{\sum_{J=2}^{K} W_{0,(J-1,J)} + T_0}$$

$$B_K = \frac{\rho_0 - \rho_N - \left(\sum_{J=2}^{K} W_{N,(J-1,J)} + T_N\right)}{\frac{\left(\sum_{J=2}^{K} W_{N,(J-1,J)} + T_N\right)}{\left(\sum_{J=2}^{K} W_{0,(J-1,J)} + T_0\right)} - 1}$$

$$A_K = \rho_0 - B_K$$

$$c_K = \frac{\frac{2\pi}{t_w}}{\ln\left(\frac{\sum_{J=2}^{K} W_{0,(J-1,J)} + T_0}{B_K} + 1\right)}$$

Below are reported diagrams using only one spiral (k=1) and repeating(twinning) the number of spiral with t_w=2,3, etc… the

number of twinning in a configuration in which spirals are distributed over the 360° .

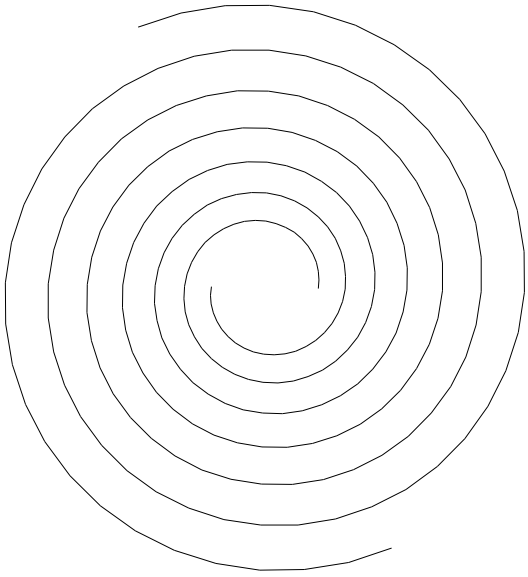

Figure 1

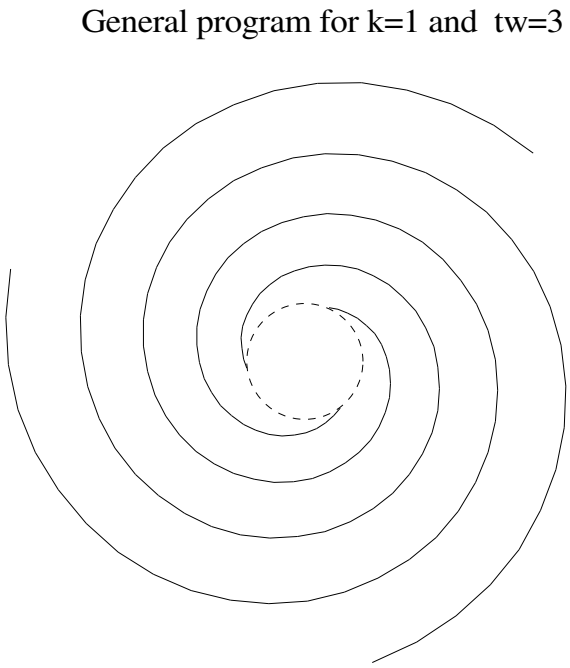

Figure 2

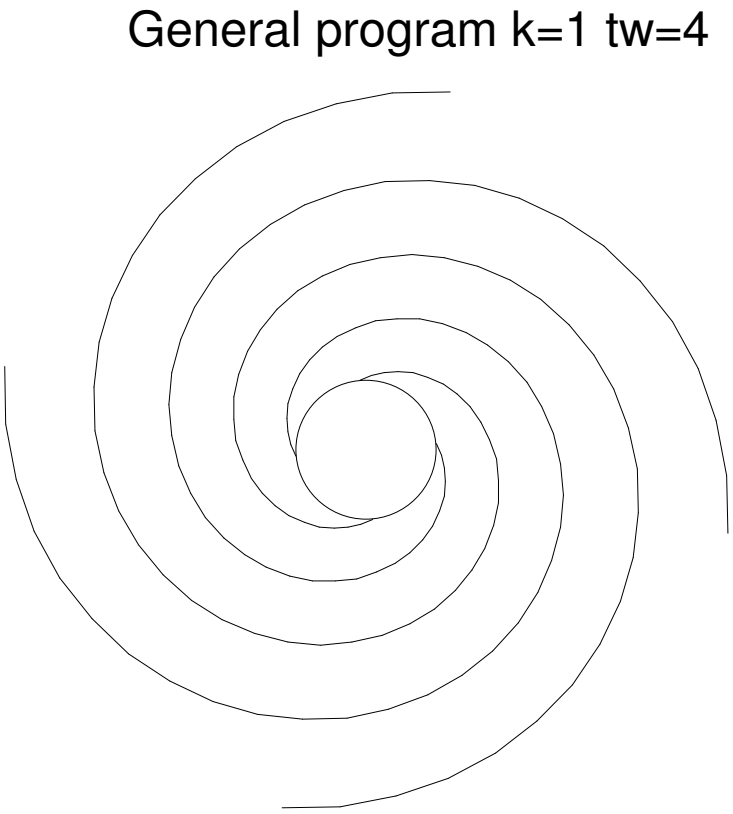

Figure 3

Note: the above configuration has been used in Ruggeri31 to profile our Galaxy (the VIA LACTEA, k=1 tw=4).

Below are reported diagrams obtained using k=2 the number of spirals in parallel, with t_w= 1,2,3, etc… the number of twinning in a configuration with k parallel spirals distributed over the 360° .

General program k=2 tw=1

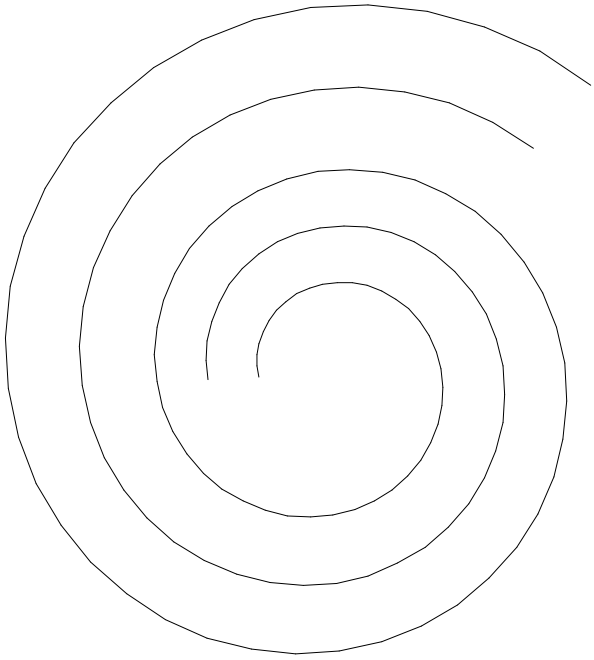

Figure 4

General program for k=2 and tw=2

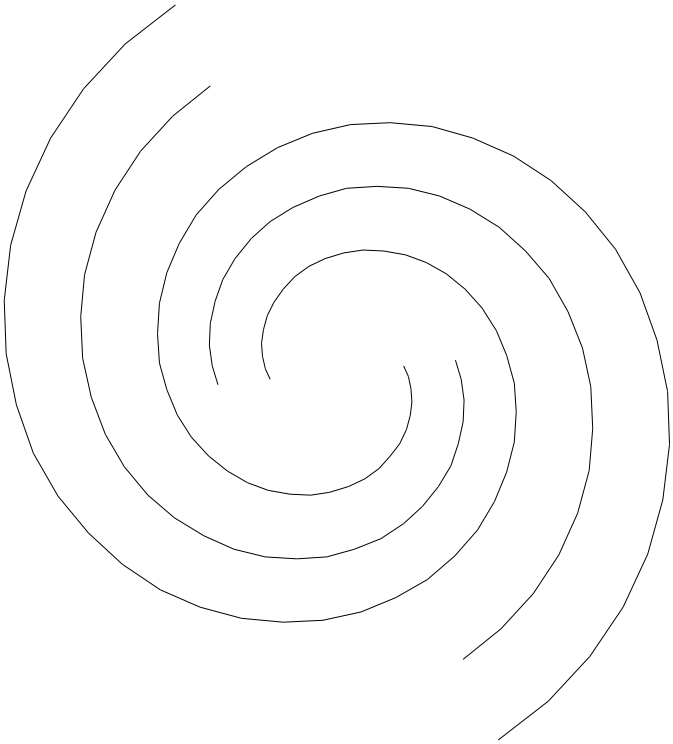

Figure 5

The possibility of combination is huge, nevertheless only diagrams promising a practical developments result worth of investigation.

The diagram below (k=1, tw=20) is representing the configuration of the blades of a centrifugal pump, presently produced industrially and available on the market.

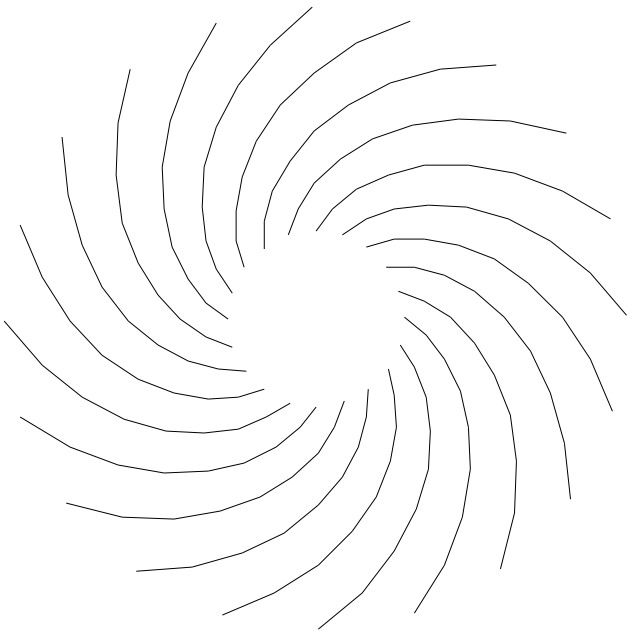

Figure 6

Below are presented variations of the diagram in Fig 6 which could be of interest

In Fig 7 is profiled a possible marina quay island with access in all directions and Fig 8 represents an idea for the development of real estate paradise islands, since the structure built in that manner will present interesting features, allowing self cleaning, whilst designed to withstand the marine fury and storms.

Mobile gates opportunely closed against the direction of the seasonal winds will permit both structure to function as harbors.

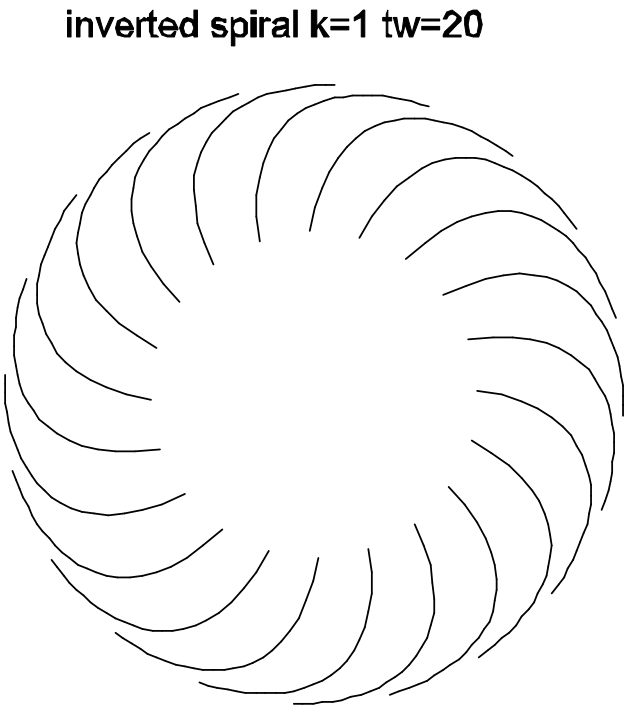

Figure 7

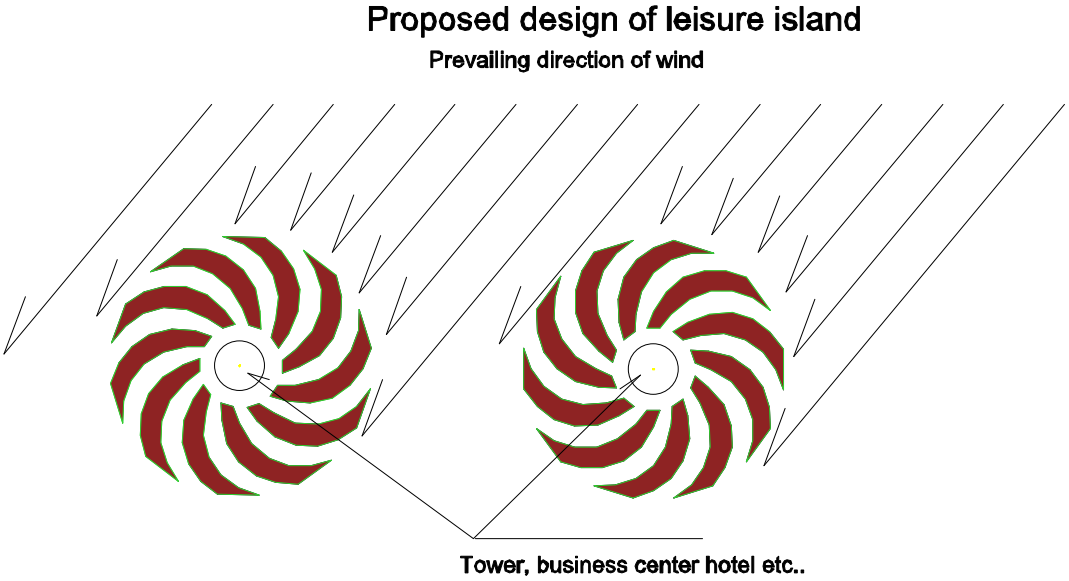

Figure 8

In the effort to conceive a more advanced system for the primary purification of water an all inclusive idea was developed and patented. Below is shown a draft diagram using the general formula above inserted into a program and developed using the configuration k=4 and tw=1 the "USA patent 4,451,357" was issued on May 29 1984 on my name and on the name of a friend who sponsored me.

Note: more info on the said patent is freely available on the internet.

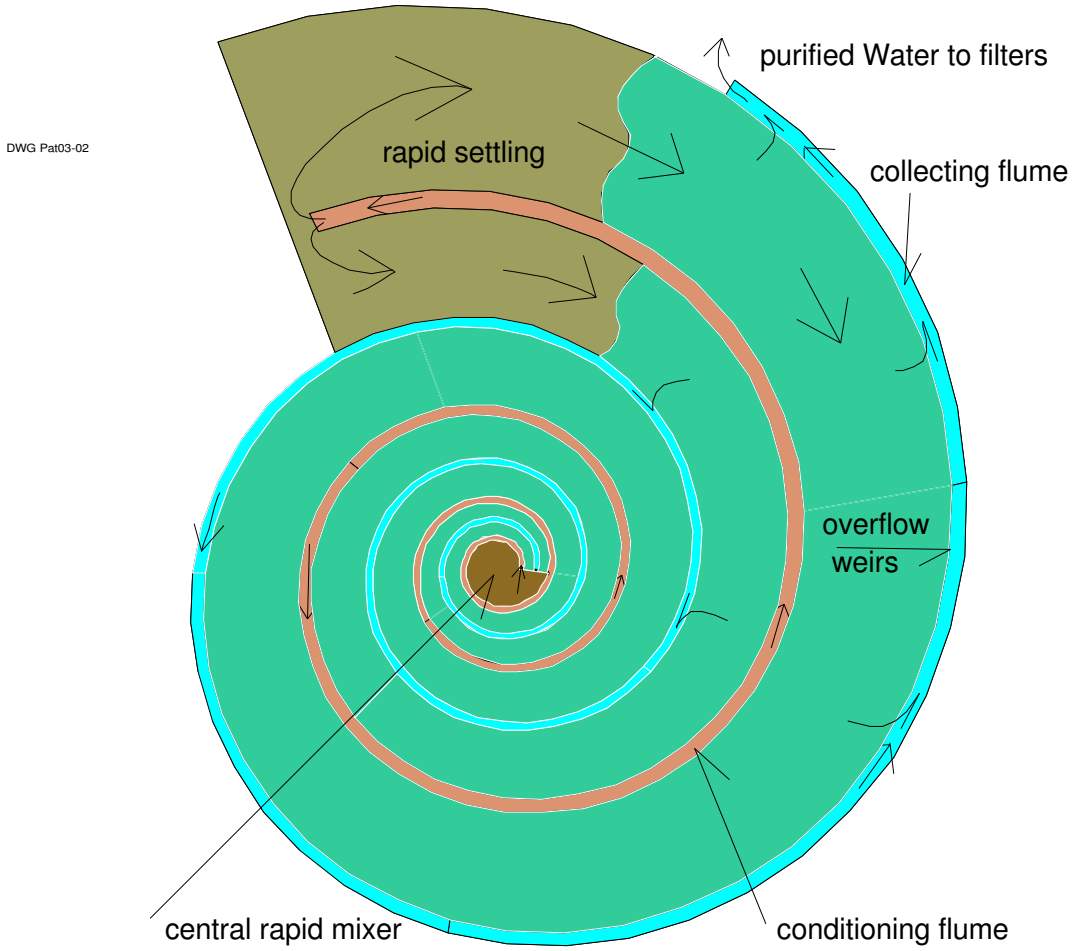

Figure 9

Note; the US patent documents contain more info.

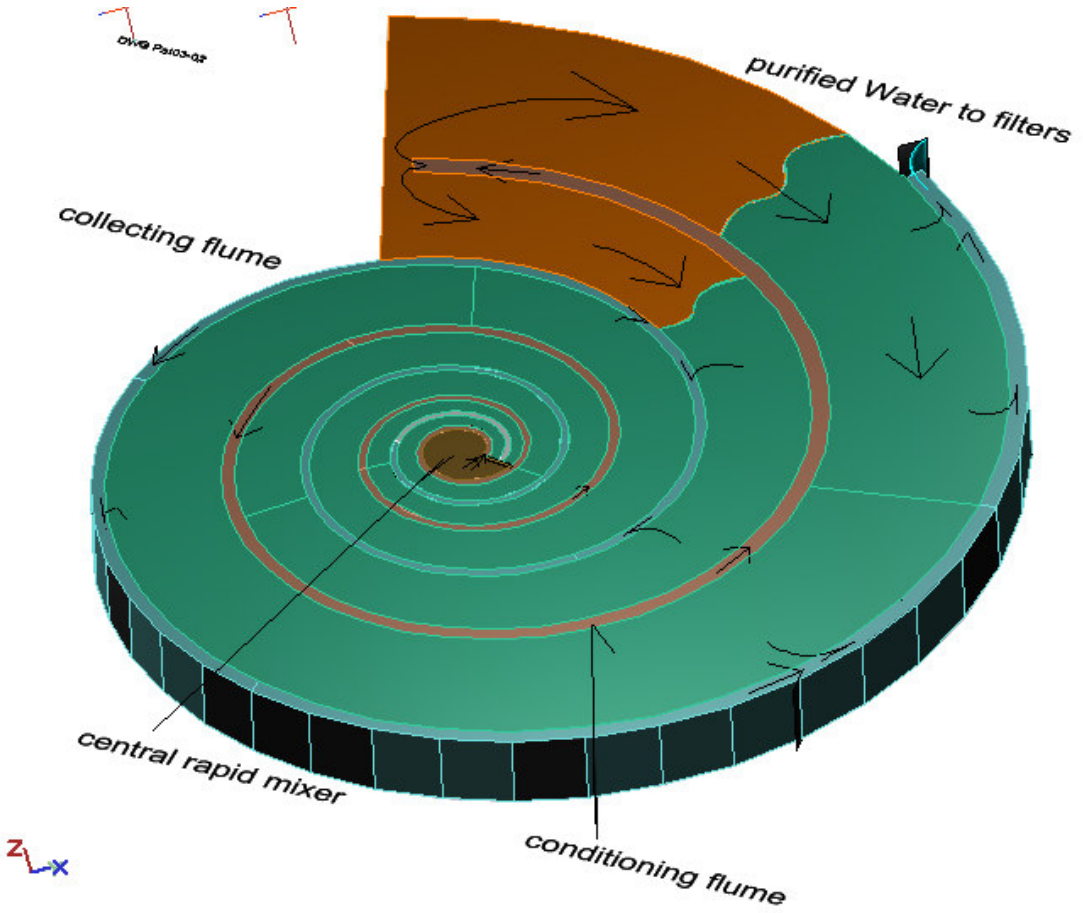

Figure 10
Note: diagrams above are indicative and not to be scaled for design purposes.

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