Calculating and fitting autocorrelation functions recorded by TCSPC system with detector and electronics dead-times

The function **`DeadTimeCorrelation`** is supposed to calculate autocorrelation functions measured with a single-photon counting system with ps/ns temporal resolution under continuous wave, constant intensity illumination. The function can be either used to calculate model curves, or to fit experimentally measured curves. In the first case, the function call is

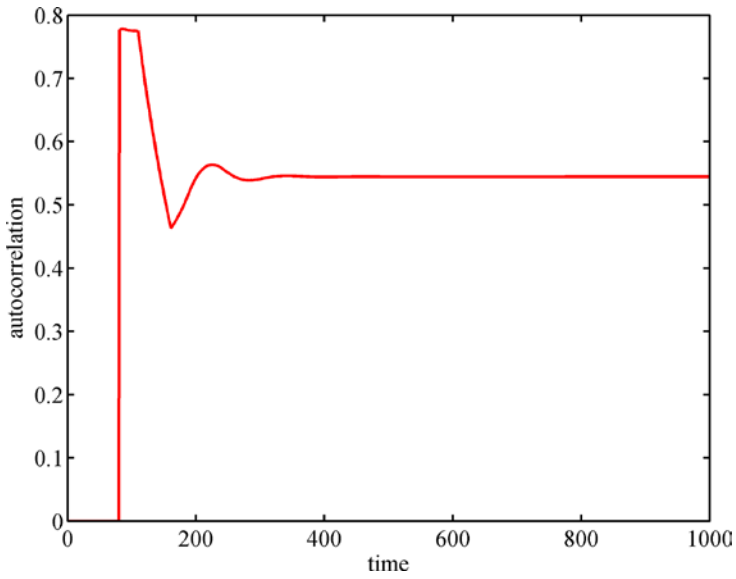
```
z = DeadTimeCorrelation(p,t)
```

The input parameters are:

`P`	A three-value vector, where **`p(1)`** is the dead-time value of the electronics, **`p(2)`** is the dead-time value of the detector, and **`p(3)`** is the average photon hit rate in photons per time interval.
`t`	Evenly space time axis vector, defining also the unit of time as the spacing between entries.

The output **`z`** of the function is the calculated autocorrelation function for the time values given in **`t`**. A typical example is shown below, for **`t = 1:1000`**, and **`p = [80, 30, 0.01]`**:

```
t = 1:1000;
p = [80, 30, 0.01];
z = DeadTimeCorrelation(p,t);
plot(t,z)
xlabel('time')
ylabel('autocorrelation')
```



When used in fitting, the function call is

```
err = DeadTimeCorrelation(p,t,y)
```

Here the additional input parameter **y** is a measured autocorrelation curve of the same length as the time vector **t**. The output is the sum of squared differences between the model curve **z** calculated for the given parameter vector **p**, and the measured curve **y**, or more precisely

```
err = sum((y – (z\y)*z).^2)
```

This output can be sued for fitting the parameter values in **p** by using, for example, a Simplex fit routine.