

Exercise 4

1. An oilfield exhibits the following data, please plot $\lg W_p$ vs. N_p type A water drive curve to determine:

- (1) Water drive geological reserves $N=?$
- (2) Oil recoverable reserve $N_R=?$
- (3) Oil recovery factor $E_R=?$
- (4) To predict the 2016's water-cut with actual water-cut's absolute error and relative error ?
- (5) If $S_{oi}=0.75$, calculate the formation of average water saturation (\bar{S}_w) in 2016

Time (year)	water-cut f_w (%)	cumulative oil production N_p (10^4 tons)	cumulative water rate W_p (10^4 tons)
1998	2.4	286.46	29.72
1999	4.5	367.83	33.58
2000	6.7	459.91	40.16
2001	10.8	569.59	53.49
2002	15.1	693.10	75.38
2003	16.4	814.83	99.30
2004	19.8	961.33	135.40
2005	24.9	1134.49	192.68
2006	34.2	1314.63	286.18
2007	43.7	1486.35	419.71
2008	51.8	1649.54	595.21
2009	56.5	1810.66	804.73
2010	64.4	1962.16	1073.42
2011	70.5	2107.63	1425.53
2012	75.1	2237.82	1817.36
2013	80.0	2354.08	2256.73
2014	83.1	2453.28	2693.59
2015	84.0	2543.22	3164.25
2016	85.5	2623.12	3634.42

Requirement: Plot water drive curve and calculating various kinds of parameters.