Consideration Geometric and Kinematic of Fracture Parameters in Asmari Reservoir of Gachsaran Oil Field Based on Image log Interpretation

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Abstract:

In this study was used from interpretation results of 12 borehole image logs(FMI, FMS, OBMI-UBI) of the Gachsaran oil field.Fracture sets were recognized in the Asmari reservoir and the compared with a folding related model (the either syn or post folding) and pre folding fracture. After that fracture sets were analyzed by statistical methods and consequently fracture sets were classified in different structural settings.finally the prevailing fracture sets recognized in study wells that is include N-S , Longitudinal and E-W fracture sets.

Keyword:Gachsaran, Lishter,Image log, Statistical,Fracture

Introduction:

The Gachsaran oil field is one of the largest oil bearing structures in south Dezful Embayment.this field is located on foot wall of Zagros mountain front fault(Fig:1).The field is one of the most complex structures in Zagros which shows two different structural trends including first: A Gachsaran field trend(SE plunge and central part of field) and second: Lishter trend(NW plunge and NW part of the field)(Fig:1).

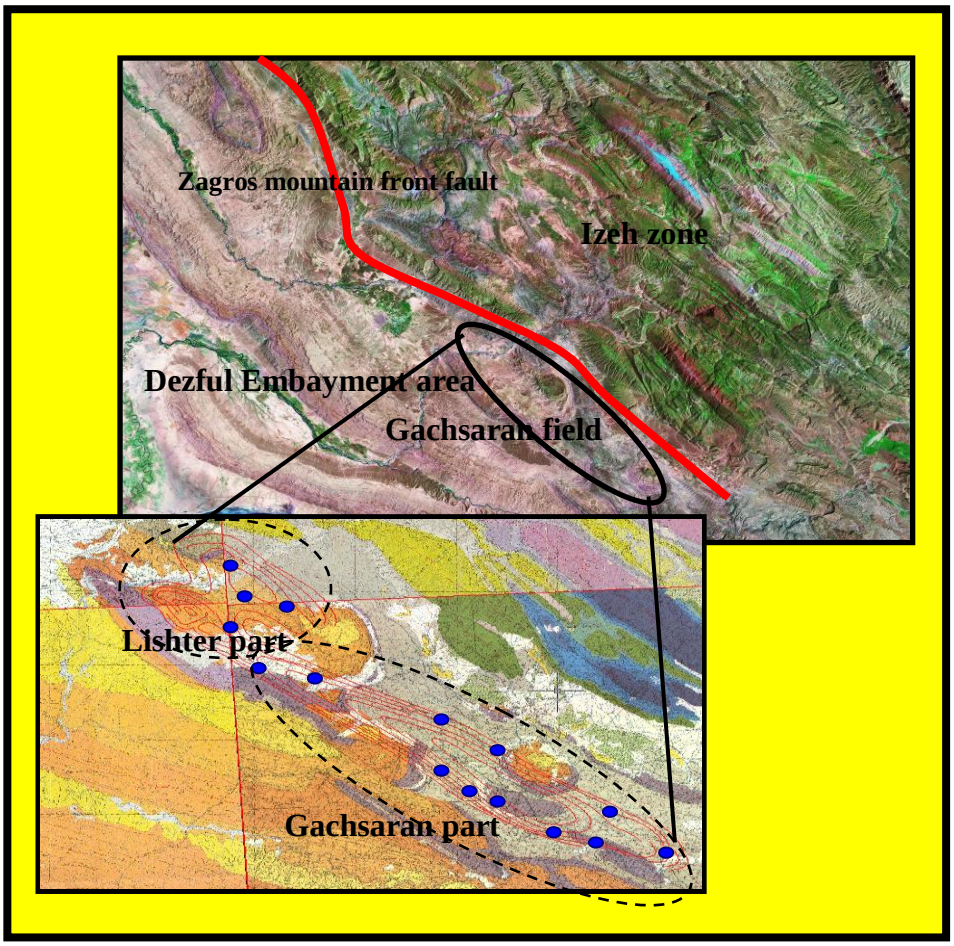


Figure1: The location of Gachsaran oil field in Dezful embayment and compared with mountain front fault position

These trends caused a complicated structural such as fold structure geometry and transversal faults which lead to a complex distribution of fractures(fig:2,3).Classic fracture classification for buckle Folding is represented by Casgrove and Ameen (2000).A regional prefolding fracture sets are also available for Dezful embayment(fracture model in IOR project for Asmari formation in Dezful Embayment). In this classification include: N50E, N-S, N20E, E-W, Longitual fracture (refolding),transverse fracture(synfolding),longitudinal fracture(synfolding) and post folding thrust set(fig:4A)(Ahmadhadi etal:2007-2008).Using a distribution methods and fracture sets classification can result in a more accurate interpretation in different structural conditions.The fracture classification in Gachsaran oil field is addressed in this paper.The results compared to last available models such as fracture model of Dezful Embayment (fig: 4A)(Ahmadhadi etal:2007)and the classical fracture related fold model(fig:4B)(Casgrove,Ameen-2000).

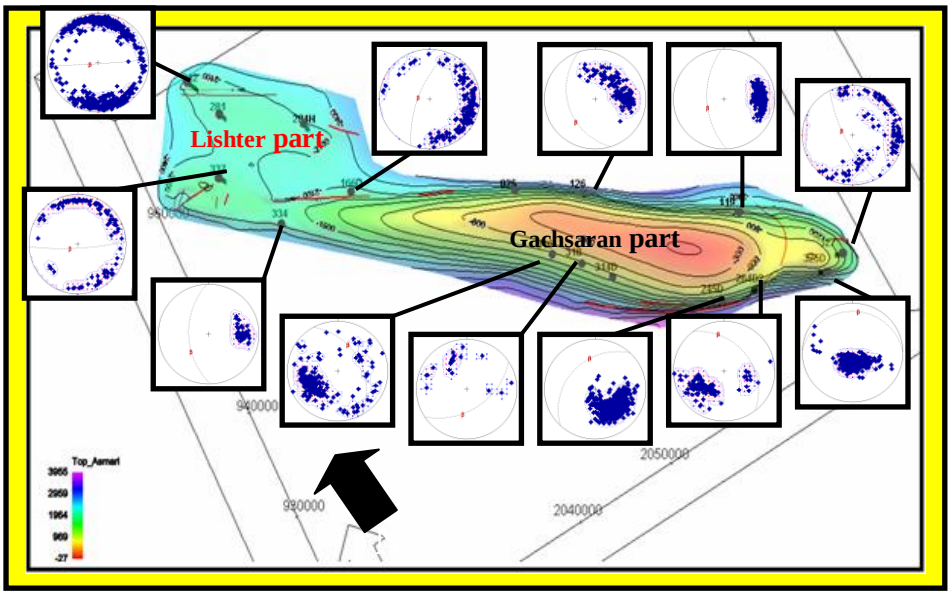
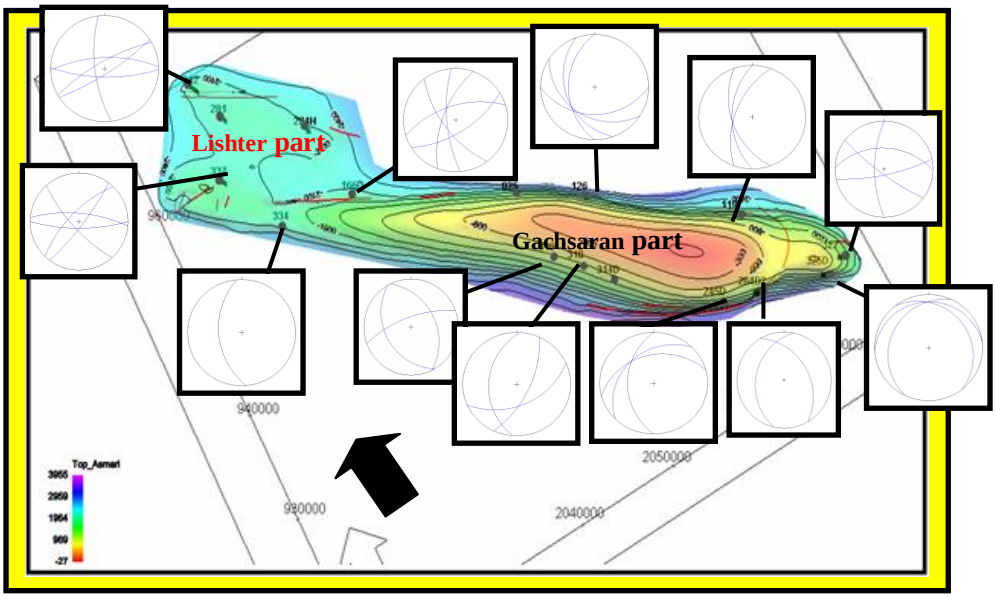


Figure2: distribution fracture poles in different structural settings of Gachsaran oil field,s geological model



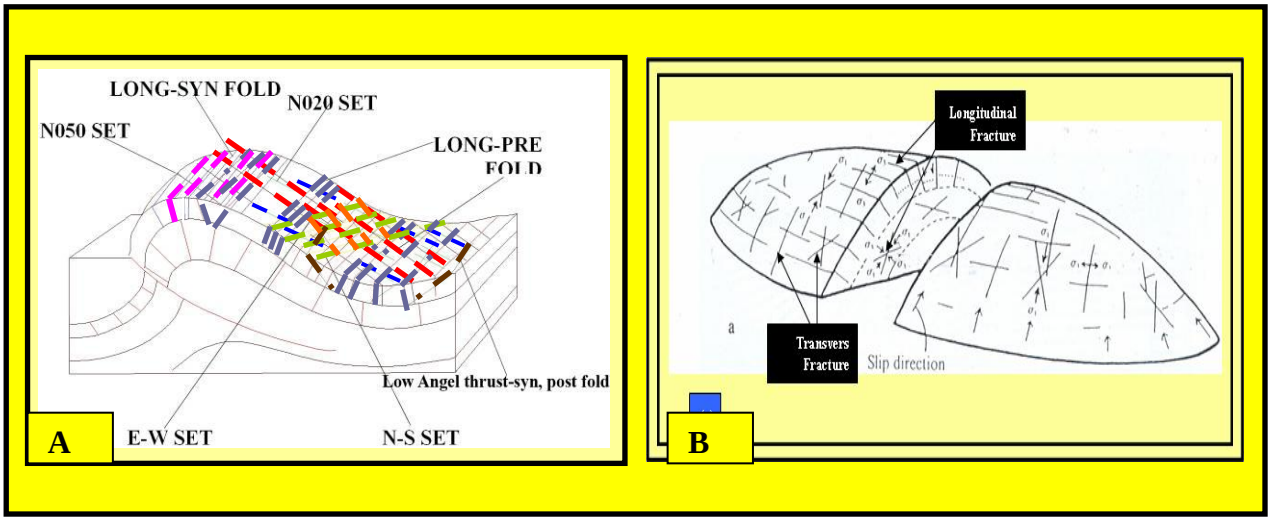


Figure4-A,B:A: fracture sets model in Dezful Embayment(Ahmadhadi etal:2007)B:classic fracture sets related to folding(Casgrove and Ameen-2000)

Results and Discussions

After preparing streionet diagrams of the fracture pole densities from bore hole image logs using a statistical detection method(fig:2,3)fracture sets of each well were classified maximum in five sets. A second step classification was carried out by a rotation method of synfolding or post folding and prefolding fracture sets(fig: 5).

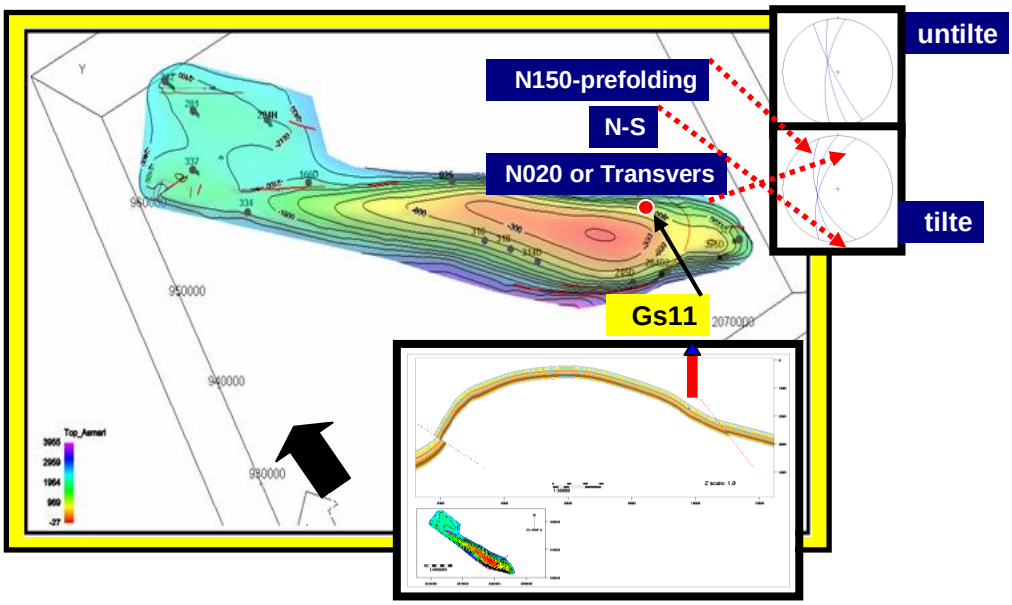


Figure5: An example showing tilted and untilted fractures with geological cross section (Gs-119)

Utilizing the recent method for each fracture sets were performed a statistical method(Table:1). Finally fracture sets in the Gachsaran oil filed have distincted by statistical method of association rate for each class of fracture sets as well as each structural setting (NW and SE plunge, NE flank and SW flank)(fig: 7).

WELL-NAME	DIP	D/D	STRIKE	SETS	DEGRE-W	Trend model	Structural setting	Other Trend
GS-25	56	289	set1-20	SET1	66	N020-set	North flank	200
GS-119	59	270	set1-180	SET1	67	N-S-PRE	North flank	0
GS-126	45	250	set1-160	SET1	66	LONG-PRE FOLD	North flank	340
GS-166	70	290	set1-20	SET1	66	N020-set	North flank	200
GS-245	40	315	set1-225	SET1	67	N050-set	South flank	45
GS-264	47	60	set1-150	SET1	66	LONG-PRE FOLD	South flank	330
GS-316	47	64	set1-154	SET1	67	LONG-SYN FOLD	South flank	334
GS-318	56	156	set1-66	SET1	67	TRANSVERS-SET	South flank	246
GS-325	15	355	set1-265	SET1	67	E-W-PRE	SE plunge	85
GS-327	74	270	set1-180	SET1	66	N-S-PRE	SE plunge	0
GS-334	55	265	set1-175	SET1	100	N-S-PRE	Lishter Area	5
GS-337	79	180	set1-270	SET1	66	E-W-PRE	Lishter Area	90
GS-342	77	181	set1-271	SET1	66	E-W-PRE	Lishter Area	91
GS-25	53	340	SET2-70	SET2	20	N050-set	North flank	250
GS-119	59	250	SET2-160	SET2	20	LONG-PRE FOLD	North flank	340
GS-126	50	270	SET2-180	SET2	20	N-S-PRE	North flank	0
GS-166	76	265	SET2-355	SET2	20	N-S-PRE	North flank	175
GS-245	50	270	SET2-180	SET2	20	N-S-PRE	South flank	0
GS-264	40	282	SET2-192	SET2	20	N020-set	South flank	12
GS-316	44	240	SET2-150	SET2	20	LONG-PRE FOLD	South flank	330
GS-318	70	115	SET2-205	SET2	20	N020-set	South flank	25
GS-325	29	295	SET2-205	SET2	20	N020-set	SE plunge	25
GS-327	82	217	SET2-127	SET2	20	TRANSVERS-SET	SE plunge	307
GS-334	no data	no data	no data	SET2	0		Lishter Area	
GS-337	78	228	SET2-138	SET2	20	LONG-SYN FOLD	Lishter Area	318
GS-342	73	358	SET2-268	SET2	20	E-W-PRE	Lishter Area	88
GS-25	60	265	SET3-175	SET3	10	N-S-PRE	North flank	355
GS-119	64	290	SET3-20	SET3	13	N020-set	North flank	200
GS-126	43	213	SET3-303	SET3	11	LONG-PRE FOLD	North flank	123
GS-166	67	343	SET3-73	SET3	10	TRANSVERS-SET	North flank	253
GS-245	44	345	SET3-255	SET3	10	TRANSVERS-SET	South flank	75

Table1:A part of statistical data for fracture sets in study wells ,include set degree,dip,dip direction,strike, statistical weight degree, candid model fracture sets

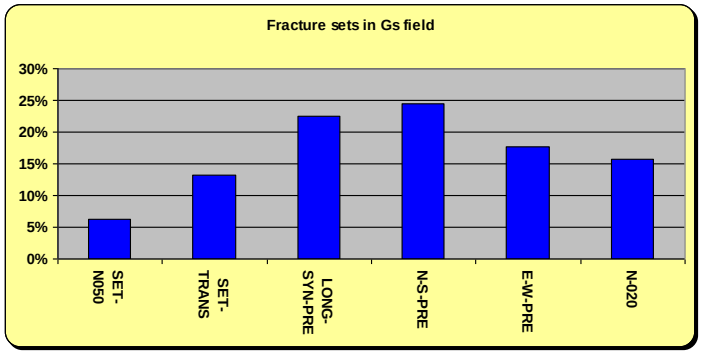


Figure6: The histogram of prevailing fracture sets in Gachsaran field

Statistical analysis method lead to classification fracture sets in different structural settings of Gachsaran oil filed(fig:7).In north-east flank, fracture classes include N020E, N-S fracture trends and pre or syn folding longitudinal fracture sets. In south west flank the other structural setting show,s the fracture sets include longitudinal and transversal and N-S fracture sets.The most densities of E-W fracture sets are on the North West plunge(Lishter area)and the south east plunge shows the highest densities with N-S and E-W fracture sets. Finally the statistical data

presented the N-S fracture set and longitudinal pre and syn fracture sets are the most important classes in Gachsaran area(fig:6)

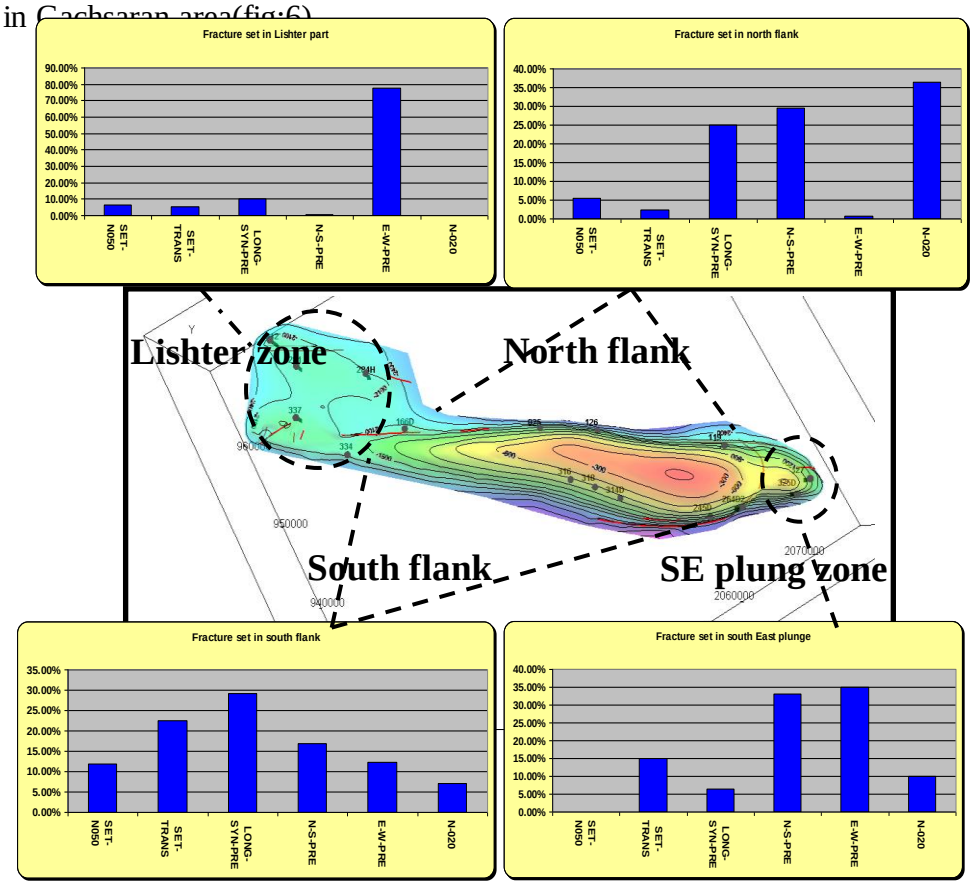


Figure7: The histogram of prevailing fracture sets in different structural settings

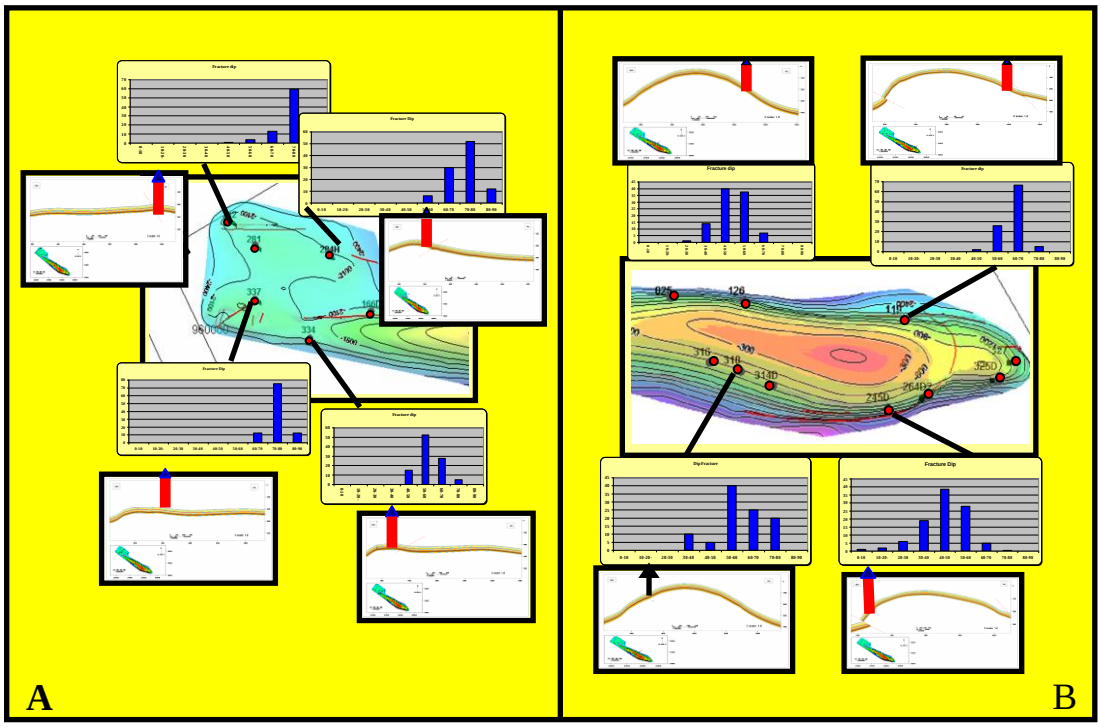


Figure8-A,B:The relationship between fracture dip and bedding dip A:low dip bedding in Lishter areaB:high dip bedding in North and South flanks

Conclusion:

1- The dominate fracture sets in study wells include N-S, longitudinal (synfolding,prefolding)and E-W fracture sets(fig:6).
2-The structural settings and type of fracture sets nearly are accordant. For example in Lishter area the most of fracture set is E-W trend. And In south east plunge the N-S and E-W sets are very important. (fig:7-8).
3- In generally there are longitudinal(synfolding or Prefolding)fractures in North and South flanks because rotational strain higher than other structural settings(fig:7).
4-The high fracture dip occurred with low bedding dip for example in the Lishter area average fracture dip is about 75-80(fig:8).
5-There is inverse or negative relationship between Fracture and bedding dip, so that lower bedding dips are occurred with larger fracture dips(fig:8).
6- Fracture intensities show a direct relationship with bedding dip and distance to the faults(fig:8).

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