JVET-AF0160
Non-EE2: On DMVR Extensions

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Introduction

- In JVET-AD0195, the high-precision equations to derive the BDOF MV refinement parameters was proposed and adopted into ECM-9.0:

$$\sum Gx.Gx * vx + \sum Gx.Gy * vy = \sum dI . Gx. \rightarrow s1 * vx + s2 * vy = s3$$
$$\sum Gx.Gy * vx + \sum Gy.Gy * vy = \sum dI . Gy \rightarrow s2 * vx + s5 * vy = s6$$

- In JVET-AE0065, iterative BDOF for multi-pass DMVR was proposed and adopted into ECM-10.0, based on:
  - *Iteratively applying BDOF DMVR*
  - *Adaptive BDOF subblock size, depending on PU size*

- Overall, current multi-pass DMVR has several stages:
  - *In the first pass, BM is applied to each CU level*
  - *In the second pass, BM is applied to each 16x16 subblock*
  - *In the third pass, iterative BDOF, with 2 iterations is applied on 8x8 / 4x4 subblocks, depending on the PU size*

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Proposed Method

- In this contribution, extensions of DMVR is proposed:
- DMVR is extended to non-equal POC distance cases.
- 16x16 iteration is added to the iterative BDOF DMVR stage
- BDOF formula is updated to include mean removed formula
  - $(\sum Gx.Gx+R1) * vx + \sum Gx.Gy * vy = \sum dI . Gx - dM . \sum Gx$
  - $\sum Gx.Gy * vx + (\sum Gy.Gy+R1) * vy = \sum dI . Gy - dM . \sum Gy$

dM is the new parameter, which is derived by the mean value differences.

Simulation Results

- Simulation results compared with ECM-10.0

	Random access Main10				
	Over ECM-10.0				
	Y	U	V	EncT	DecT
Class A1	-0.18%	-0.15%	-0.27%	101.9%	102.4%
Class A2	-0.22%	-0.24%	-0.28%	101.7%	103.3%
Class B	-0.13%	-0.17%	-0.15%	102.7%	103.3%
Class C	-0.18%	-0.24%	-0.28%	101.8%	102.5%
Class E					
Overall	-0.17%	-0.20%	-0.24%	102.1%	102.9%
Class D	-0.31%	-0.31%	-0.26%	101.4%	102.1%
Class F	-0.01%	-0.11%	-0.01%	100.9%	103.4%

Conclusions

- Improvement for DMVR is proposed.
- It has -0.17% gain for RA configuration, with 102%/ 103% complexity on top of the ECM-10.0.
- It is recommended to study the proposed method in the next round of EE2.