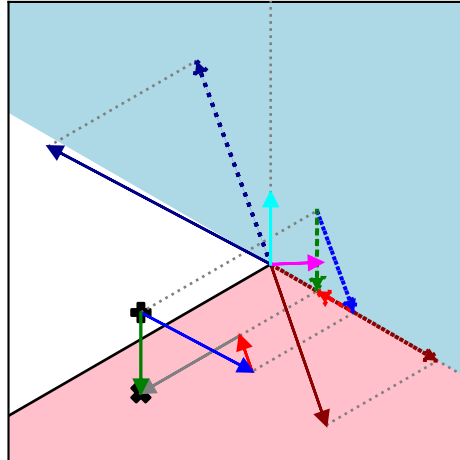
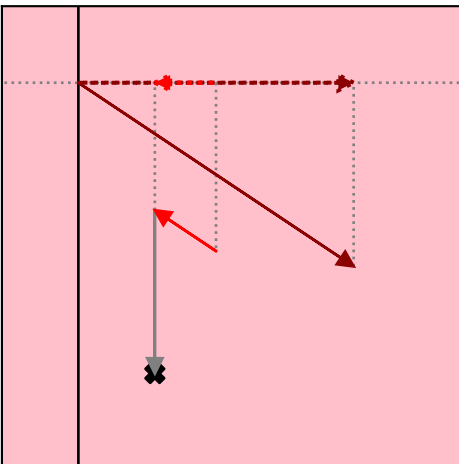


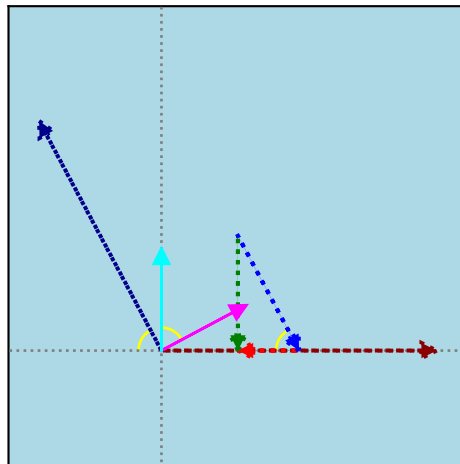
(a) [3D] Babai's Projection



(b) [3D] Babai & OBQ Equivalence



(c) [2D] Nearest Hyperplane



(d) [2D] Orthogonal Projection Plane

- ..... Auxiliary Line in Orthogonal Directions
- Basis Vector  $\mathbf{b}_{j_1}$
- Basis Vector  $\mathbf{b}_{j_2}$
- ⊕ Target Point  $\mathbf{y} := \sum_j \zeta_j \mathbf{b}_j$
- Nearest Hyperplane  $\mathcal{NHP} := [\zeta_{j_2}] \mathbf{b}_{j_2} + \text{Span}\{\mathbf{b}_j \mid j \neq j_2\}$
- Hyperline  $\mathcal{HL} := [\zeta_{j_2}] \mathbf{b}_{j_2} + \text{Span}\{\mathbf{b}_j \mid j \neq j_1, j_2\}$
- ⊗ Babai's Projected Point  $\text{Proj}_{\mathcal{NHP}}(\mathbf{y}) := \sum_j (\zeta_j + \Delta \zeta_j) \mathbf{b}_j$
- Error Vector  $\Delta \mathbf{y} := \text{Proj}_{\mathcal{NHP}}(\mathbf{y}) - \mathbf{y} = \sum_j \Delta \zeta_j \mathbf{b}_j$
- Error Component Vector  $\Delta \zeta_{j_1} \mathbf{b}_{j_1}$
- Error Component Vector  $\Delta \zeta_{j_2} \mathbf{b}_{j_2}$
- Remaining Error Component Vector  $\sum_{j \neq j_1, j_2} \Delta \zeta_j \mathbf{b}_j$
- Inverse Basis Vector  $\mathbf{n}_{j_1} : \langle \mathbf{n}_{j_1}, \mathbf{b}_{j_1} \rangle = 1; \mathbf{n}_{j_1} \perp \mathbf{b}_j, \forall j \neq j_1$
- Inverse Basis Vector  $\mathbf{n}_{j_2} : \langle \mathbf{n}_{j_2}, \mathbf{b}_{j_2} \rangle = 1; \mathbf{n}_{j_2} \perp \mathbf{b}_j, \forall j \neq j_2$
- Orthogonal Projection Plane  $\mathcal{OPP} := \text{Span}\{\mathbf{n}_j \mid j = j_1, j_2\}$
- ..... Projected Basis Vector  $\text{Proj}_{\mathcal{OPP}}(\mathbf{b}_{j_1})$
- ..... Projected Basis Vector  $\text{Proj}_{\mathcal{OPP}}(\mathbf{b}_{j_2})$
- ..... Projected Error Vector  $\text{Proj}_{\mathcal{OPP}}(\Delta \mathbf{y}) = \Delta \mathbf{y} = \sum_{j=j_1, j_2} \Delta \zeta_j \text{Proj}_{\mathcal{OPP}}(\mathbf{b}_{j_1})$
- ..... Projected Error Component Vector  $\Delta \zeta_{j_1} \text{Proj}_{\mathcal{OPP}}(\mathbf{b}_{j_1})$
- ..... Projected Error Component Vector  $\Delta \zeta_{j_2} \text{Proj}_{\mathcal{OPP}}(\mathbf{b}_{j_2})$
- Angle  $\theta = \angle(\mathbf{n}_{j_1}, \mathbf{n}_{j_2}) = \pi - \angle(\text{Proj}_{\mathcal{OPP}}(\mathbf{b}_{j_1}), \text{Proj}_{\mathcal{OPP}}(\mathbf{b}_{j_2}))$