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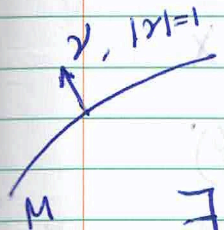
$$g(A_\nu(X), Y) = g(\alpha(X,Y), \nu)$$
$$= g(\bar\nabla_X Y - \nabla_X Y, \nu)$$
$$= g(\bar\nabla_X Y, \nu)$$
$$= -g(Y, \bar\nabla_X \nu)$$

$\therefore$
$$A_\nu = -(\bar\nabla \nu)^T$$

<u>Ex</u> hypersurface $f: M^n \hookrightarrow \bar{M}^{n+1}$



$\because$ $g(A_\nu(X), Y) = g(A_\nu(Y), X)$

i.e. A_ν is symmetric,

$\exists$ o.n. $e_1, \dots, e_n \in TM$

$A_\nu(e_i) = \lambda_i e_i$

Assume $\{e_1, \dots, e_n\}$, $\{e_1, \dots, e_n, \nu\}$ define orientations on M, $\bar{M}$

λ_i : principle curvatures

e_i : principle directions

$\frac{1}{n}\sum \lambda_i$: mean curvature of f

$\lambda_1 \cdots \lambda_n$: Gauss-Kronecker curvature