This contribution presents state of the art solution techniques and discusses current trends in computational fluid-structure interaction (FSI). The desirable weak coupling partitioned solution schemes are considered and the limits imposed by the artificial added mass effect are shown. This is why strong coupling and even monolithic schemes got considerable attention, even though most of those schemes violate the field solver decoupling. Monolithic schemes based on a block preconditioned Newton-Krylov method are discussed. Finally, the limits imposed by an ALE description of the fluid domain are addressed and an XFEM based fixed-grid is presented as an interesting alternative. Thin-walled structures - the topic of this book - are only rarely explicitly mentioned in this paper. However many challenges described and solved herein are especially pronounced when FSI involves thin-walled structures with large deformations.