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Fast solutions in FSI-Problems using CMS-Methods

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Parameter studies in FSI-problems may often become quite time consuming. In most cases the fluid parameters are well defined and only the influence of the parameters of the solid is subject to investigate. Therefore it would be desirable to investigate the fluid and solid part separately and finally combine them using CMS-Methods. This approach would also provide a good physical insight into the individual and combined behaviour of the components fluid and solid. Generally for each interface DOF one constraint mode must be added to the modal base. Since in most problems in FSI the fluid-structure interface involves many DOF the general CMS approach becomes inefficient. To reduce the number of constraint modes it is proposed to use the mode shapes of each component as a load function on the other domain. The static solution provides the modal based constraint modes. Their number corresponds to the number of total component modes which is in most cases much less then in the classic approach. The application is shown in optimization, updating, and monte-carlo-simulation problems.